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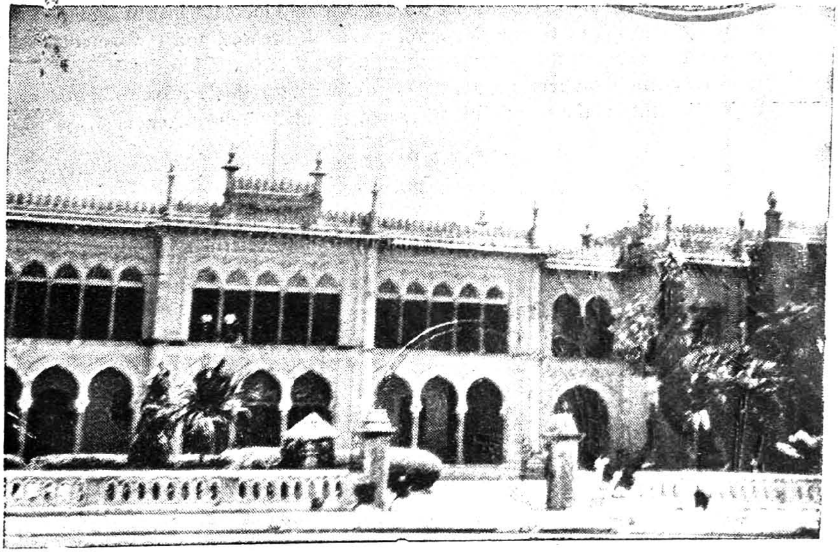

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Volume XIV

March 1956

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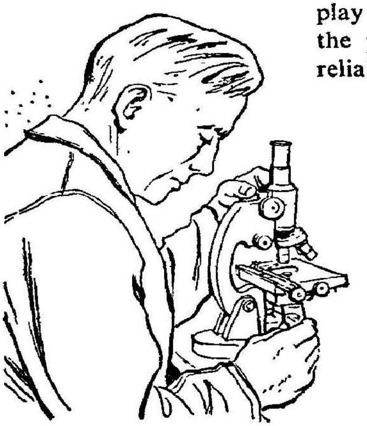

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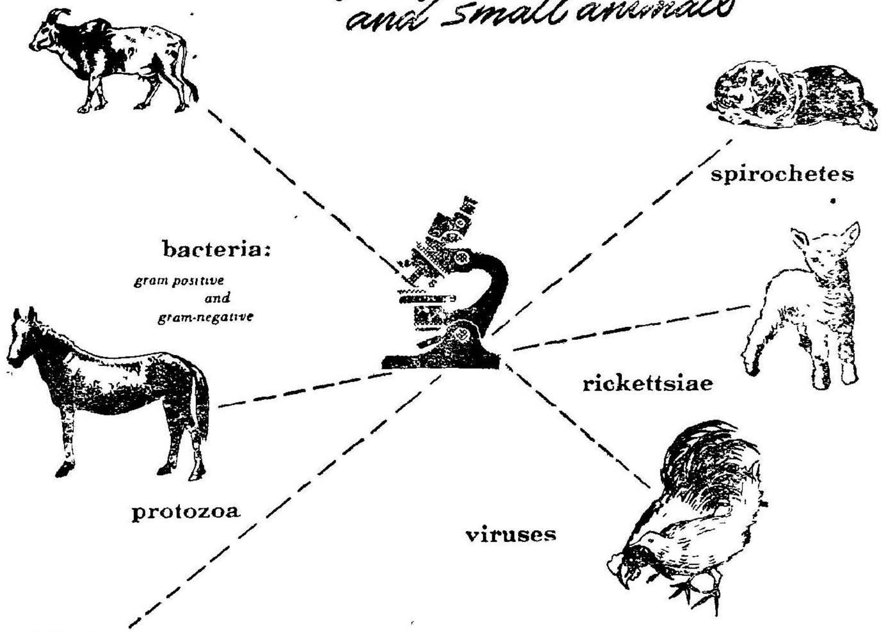

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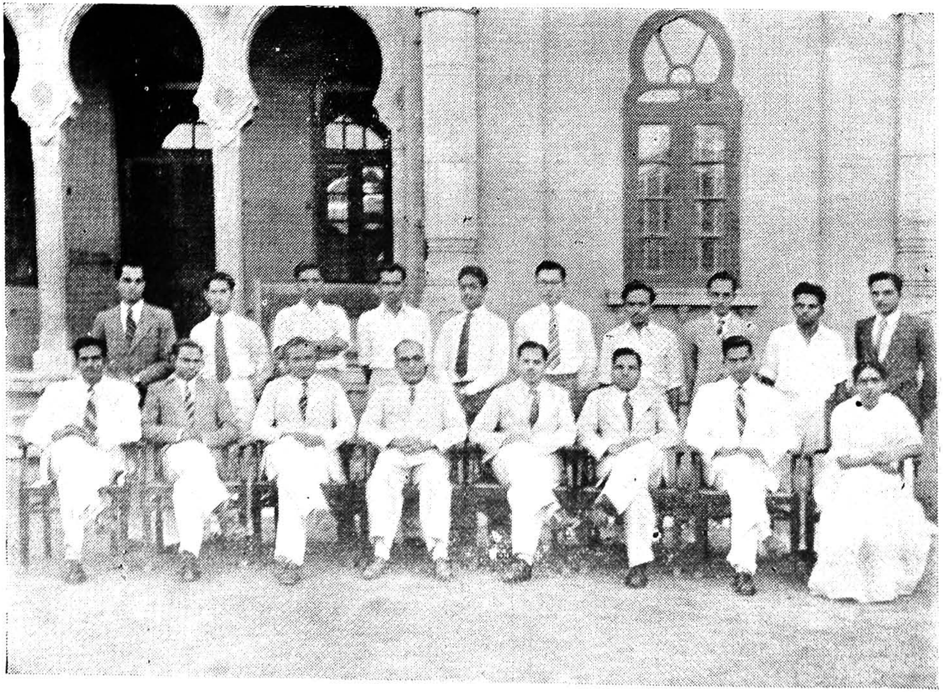

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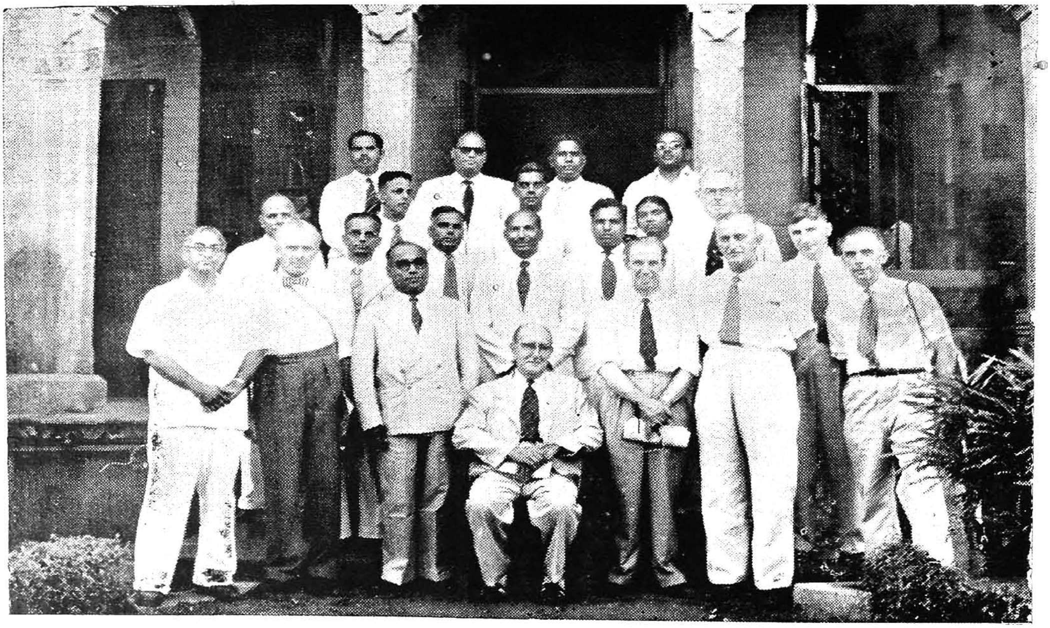

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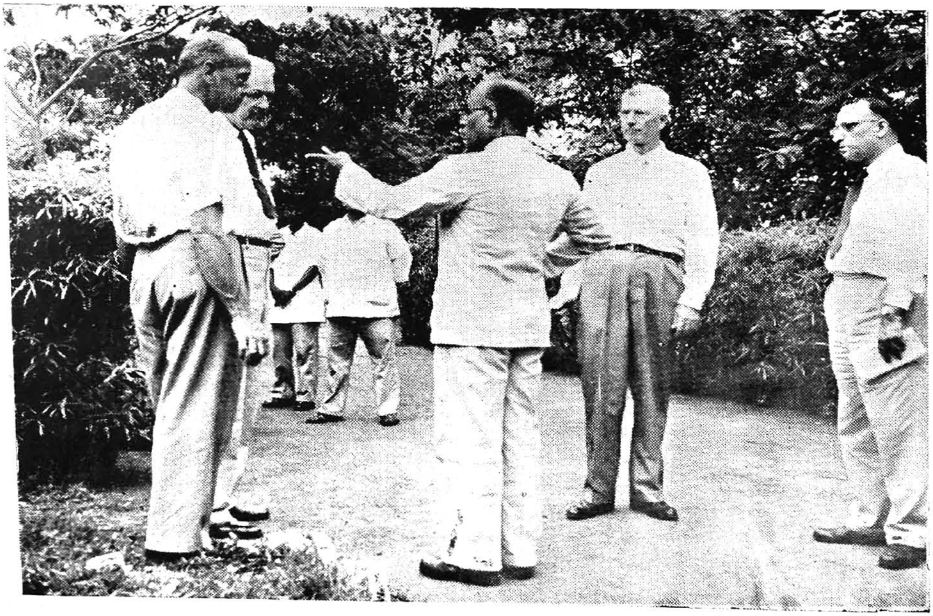

The Principal with the Tennesse Valley University Team

EDITORIAL

ONE of the important responsibilities of institutions of higher learning has always been to prepare men and women for the professions. The tremendous expansion that has taken place in our country is of unprecedented proportion and with it the role of the veterinarian in the economic prosperity of our country has been rightfully appreciated. The scope and complexities of these developments together with a deepening realisation of its social significance has called for a far more penetrating study of veterinary education than has yet been given to it. There was need to reconsider goals, to improve processes and procedures, and to develop new modes of management and direction. Our Government responded with alacrity and our college continues to blossom forth as one of the most advanced institutions of veterinary learning in the country.

The most *outstanding activity* of our college was, that 80 students offered their services to the cyclone stricken areas of Madurai, Ramanathapuram, Tiruchirapalli and Tanjore where they rendered yeoman service in the combat of livestock epidemics following the floods Similarly the Final Year students with the Professor of Medicine attended an outbreak of cattle disease at Tambaram. More opportunities like these should be given to students to work in rural areas. This should be a part of the curriculum.

Students and members of the staff contributed unskilled labour for the construction of an open air theatre, under the Youth Welfare Programme sponsored by the Ministry of Education, Government of India, through the University of Madras. Thus every member has a sense of personal participation in the building up of our college.

It will not be an exaggeration to state that every team and individual veterinarian coming from abroad has not failed to visit our college and be impressed by the work done in this institution for the advancement of Veterinary Science and Animal Husbandry.

The Indo-American Team on Agriculture and Veterinary Education has recommended that, our college should with Central assistance be made a strong centre of Post-graduate teaching, ranking it next only to the Indian Veterinary Research Institute, Izatnagar.

Our college has started a Post-graduate course in Veterinary Parasitology. Research in other branches of Veterinary Science may be opened shortly.

For the first time in the annals of our college, prizes and medals were made available at the University for award to the best students in various subjects at the time of the convocation. We sincerely thank the donors for their generosity.

We welcome several new members who have joined the staff. Dr. M. C. Chellam, G.M.V.C., F.R V.C.S., our New Sterility Officer, has recently returned from Stockholm, Sweden. Our college will soon have a separate department and Chair in Veterinary Obstetrics and Gynaecology for which his services are being utilised. Dr. G. Subramanian, B. V. Sc. has left for U. S. A. for higher studies, we wish him all success.

Our congratulations go to Dr. V. S. Alwar and Dr Bhaskaran who have been awarded the M. Sc. degree by the University of Madras. We also congratulate Dr. M. Mishra, recipient of the Panikkar Gold Medal, 1955.

It is a matter of profound regret to note the sudden demise of our beloved Professor of Parasitology, Dr. G. Ramanujachari, B. Sc, G M.V.C, B.V.Sc His wide grasp of the subject, original methods of approach critical outlook, powers of analysis and sound judgement gave him a distinguished place among the scientists of our country

We wish our outgoing members all the best in their future career, and for those of us who remain we hope that in great things and small we may uphold and strengthen the good name of our college and profession.

Thoughts on Veterinary Practice

By

M. N. Menon, G.M.V.C., B.V.SC., M.R.C.V.S.

Department of Surgery.

'Kill a thousand patients to become half a Doctor' is an adage which is perhaps the most true applied to the Veterinarian engaged in the art of healing of the sick animals. But killing unaccompanied by the holy curiosity to know more will only be a criminal action. It is essential that the veterinary clinician should study the animal in health and disease, in the living and in the dead. It is certainly not an easy vocation particularly for those whose aim is reward. The animal patient is incapable of articulation and the animal owner may be in a hurry even to say thanks.

It has been often said with some sense that the veterinarian is lucky that his patients do not talk but it is not realised that they bite, kick and behave in many other ways making the task of detecting disease by objective evidence alone even more arduous. By persuation and tact and infinite forbearance the clinician has in front of him the task of managing the patient and its owner. He has to be a psychologist of not only the multiplicity of animals who may be his patients but also of a variety of human beings including the more well to do of the female sex. It is very often the case that by the time animals are presented for treatment the stage of the disease has advanced considerably and if as it does happen salvage therapeutic measures fail not unexpectedly, the reward is foul benediction and a tirade against the individual and the institution. A great deal of this neglect and its consequences is due to ignorance of the animal mechanism. The fussy owner like the anxious parent is unable even to furnish correct data regarding the history of the ailment. The veterinary clinician like the pediatrician has to detect diseases by a systematic approach and careful observation of the patients and render treatment even against the will of the subject. To be able to do so the clinician has to possess a sound knowledge of Anatomy, Physiology and Pathology of animals as well as the ability to record precisely the nature of each case observed and treated.

The animal organism like the human body is composed of various systems like the nervous, respiratory, circulatory, digestive, excretory, genital and locomotor systems over and above the five sensory systems. Any or all of these systems could be damaged and it will be too much to expect that the clinician should be well versed in the normal and abnormal variations regarding all these units that go to form the body. A certain degree of specialisation thus becomes necessary even in veterinary clinicopathology however much the scope for such specialisation is restricted. It is the absence of this eye for specialisation that is responsible for the backwardness of the veterinary art as compared to medical art even though the former is of greater antiquity. Animal life is estimated always in terms of utility and economy. Once the animal ceases to be so useful, Euthanasia is freely recommended and accepted on grounds of false humanitarian consideration This must be prevented at all costs as otherwise all scientific progress in the diagnosis and treatment of animal diseases will have to come to a standstill. The veterinary clinician in order that he may exist and progress will have to tackle the problem of animal disease from two angles, *viz.*, preventive and curative. Of these it is necessary to give greater importance to prevention of disease than to the curative aspect.

Animals under domestication have learnt to be dependant on the human being, and they have to be fed, housed and looked after in various other ways. An animal in

health, be it a horse, cow or dog should show appetite and interest in food suitable to the species and water. Whereas a dog is given only one main meal a day, the horse has to be fed twice or thrice, if at vigorous work. Likewise excretion of waste products in the form of urine and faeces should take place normally. Whereas a dog has only one motion a day, the horse and cow does it twice or thrice. Whereas horses are watered and fed separately in order to facilitate mastication and digestion, cows are fed together with water. Whereas the cow and the horse should be fed salt in the diet the dog should not be. The salt lost in the dog by sweat is very little being not a sweater excepting from between the pads and this loss is compensated by the normal chloride content of meat, rice, vegetable, milk etc., in the diet. Whereas the cow can be washed frequently the horse and the dog should not be. Instead they should be groomed and brushed respectively. In this manner the veterinary clinician has to give advice and information to keepers of animals so that there is less of disease on account of ignorance in management and neglect.

If the animal has clear bright eyes, if the ears are alert and attentive, if the appetite is good, if the coat retains the natural gloss without showing bare patches, if the mouth and coat do not smell offensive and if the general condition and body weight is maintained, it is reasonable to assume that normal health is being maintained. Besides, watering from the eyes and nostrils, excessive salivation, coughing, excessive sweating, easy exhaustion, vomition and diarrhoea, jerky and or unsteady swaying movements are all abnormalities. Excessive appetite as well as massive defecation are also due to some systemic upset which will have to be investigated. In this manner if a continuous check is maintained there will be indeed very little disease and even if there is this may largely be curable. Besides a number of infectious and contagious diseases could be warded off by effective prophylactive methods of treatment. Thus it is possible to maintain a high standard of animal health. Detection and treatment of animal diseases could be made easier and more effective.

Negligence is the rust of the Soul, that corrodes through all her best resolutions.

Today well lived makes every yesterday a dream of happiness and every morrow a vision of hope.

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Cottage Chrome Tanning of Hides and Skins

By

F D. Wilson, G.M.V.C., B.V. Sc.
Department of Flaying and Meat Hygiene.

Hides available in the market are in one of the following forms :

Flint—framed or unframed.
Dry salted.
Wet salted.

Of these varieties, the wet salted hide is preferred for tanning although it keeps for a much shorter time than the dry salted hide.

Soaking : The tanning process commences with the soaking operation. On arrival at the tannery the hide pieces are weighed and measured and then put in water for soaking in pits. The pits vary in size according to the hides and skins. The pits are 5″ brick cisterns placed on concrete floor and the object of soaking is to wash off salt and dirt and bring the hide back to its original soft and supple-state.

Wet salted hides require only about 6 hours soaking whereas the dry salted ones take a day. Flint hides require a much longer time. However it is dangerous to allow too long a soak as deliterious bacteria may develop and eat away the hide substance. The process of soaking may be shortened by adding 1/2% caustic soda of the weight of the hide to the soak water.

The soaked hide is removed when fit and the next process of beaming is performed. For this the soaked hide is placed on a beam. The beam is a trunk of a tree about 5′ long and split into half. It is well set, inclined on the floor. The outer surfaces of the beam should be smooth and without curvatures or waviness. A blunt knife having a gentle curvature suiting the curvature of the beam and known as the scudding knife is then taken and worked gently on the flesh side of the hide. By treating in this manner, all the dirt and blood clots are loosened out and by the wash which follows, the hide is rendered suitable for the next process.

After the scudding, the hides are washed and placed in lime pits for liming. After soaking the pieces are generally cut into two along the middle line of the back from the tail to the neck. However calf skins and hides below 15 sq. ft. in area are left entire. Each cut half is known as a side and this is to facilitate easy handling.

Liming : The object of liming is two-fold. Firstly to dissolve the epidermis and as a result the hairs become loose and could be easily rubbed off. Secondly it swells the hide and brings it to the plumpness required for impregnation with tanning material.

Liming pits are similar to soaking pits and their number depends on the number of days of liming to be given to a pack. Usually liming is done for 4 to 6 days. In the liming pit not only lime but also certain bacteria act on the hide thus causing the hair roots to loosen. The action of the bacteria does not stop here. If allowed to continue they eat into the hide substance and make the leather thin and of poor quality. The longer the liming, the greater is the bacterial activity and action. The offensive odour in a tannery is due to bacterial action in the lime pit. Quick unhairing is insufficient. Swelling and plumpness should be sufficient and these should not do any injury to the grains of leather. The best effects may be had by using 15% to 20% of lime of the weight of the hide. While too much of lime may cause no ulterior effect, too little causes

disastrous results. 2% sodium sulphide used with lime enhances its powers.

The lime pits are made ready by putting the required quantity of lime in the pit and stirring with water. Then 2% sodium sulphide is weighed separately and boiled with water in a separate container. The solution is then added to the lime pit. Enough water is poured in the pit so that the hides when dipped may be laid flat and at the same time, the water may be stirred. The next day the hides are removed completely from the pit, the lime pit stirred well and the hides replaced. This process is known as hauling and replacing. Hauling and replacing are done for about 6 days by which time the hides are ready for being taken out and washed.

Washing is done in a pit filled with water in which a piece of hide held by two people is drawn about. After washing, unhairing and fleshing are conducted.

Dehairing and Fleshing : The hide is placed on the beam and unhairing is done with a double handled concave steel knife. The operator should use rubber gloves to protect his hands and a leather apron to protect his clothes.

After unhairing the hides are washed by drawing through water and left overnight in a water pit. Unhairing is usually done on the 7th day.

The washed pelt is fleshed next. Fleshing is done on a beam with a flat surface with the help of a double handled straight knife. Fleshing is performed by taking off layers by slicing, from the underside of the skin. The slicings thus made are known as fleshings and are dried in the sun to be later converted to glue.

Deliming : After fleshing, the hides are again thoroughly washed in soft water. After 2 changes of water deliming is proceeded with. Deliming dissolves the lime which caused the plumpness of the pelt. On removing the lime the fibre bundles of hide get free to be acted upon by tanning liquor. By deliming the hardness, thickness and rubbery feel which are characteristic of liming are lost. Deliming is a delicate operation and if underdone or overdone will materially affect the finished leather. Leather in fact is made in liming and deliming operations.

Deliming is first done by washing in changes of water. But this does not completely free the pelt of lime. Hence some acid is added. Boracic acid is preferred as it leaves the grain surface, soft and silky. Further boracic acid does not swell the fibres. The amount of boracic acid required depends on the amount of lime left in the hide. In well washed hides ½% of weight of hide of boracic acid may be used. Deliming is best done in drums made from wooden barrels or in earthern tubs. When properly done it takes only an hour.

Bating : The next step of bating facilitates the dissolving of remnants of lime in the pelt by the action of enzyme. The enzyme not only dissolves the lime but also gives the leather a special feel and stretch. This can be accomplished by artificial bates or with preserved pancreas. Preserved pancreas is chopped and ground to a paste and dissolved in water to which ammonium chloride is added. Two grams of raw pancreas per pound of pelt is sufficient. The amount of ammonium chloride for this is 10 grams.

Pickling : Pickling, the next process, is a process preparatory to tanning. Pickling gives the finished leather a soft and good feel and ensures thorough penetration of the chrome salt.

The hide is subjected to the action of sulphuric acid and common salt and is carried out in drums. If the salt and acidity concentrations are kept constant it may be used over and over again. Water twice the weight of the hide is used and in it common salt 10% of the weight of hide is added and also 1% sulphuric acid. Pickling is done for 1 to 1½ hours and the techni-

ques of deliming, bating and pickling should be done one after another on the same day, namely the 7th day from soaking.

Tanning: Tanning is effected by applying a basic solution of chromium to the prepared pelt. In the one bath type the solution is dilute at the beginning and should be gradually concentrated as tanning proceeds. The process is carried on till sufficient chrome salt has been absorbed by the leather.

Chrome tanning liquor is prepared by dissolving 50 lbs. of Sodium bichromate in hot water and then adding 50 lbs. of acid sulphuric 1740. To this is slowly added a solution of molasses 30 lbs. by weight. The bulk is made up to 250 lbs. with water. The chrome liquor should be basic.

The tanning is done in drums filled with water to the extent of 4 times the weight of the hide. 5 to 10% salt on the weight of the hide is added and dissolved. This is introduced for giving greater softness to the finished material. After introducing the hides the drum is rotated and then chrome liquor is added in portions and the drum rotated slowly, 4 to 5 revolutions per minute. As tanning proceeds more and more chrome liquor is added till the full quantity (Sodium bichromate) 4% of the weight of the hide is added.

6 to 8 hours are required for light hides for tanning and the drums should be rotated during this time. The pack should be left overnight in the chrome liquor. Special attention should be paid to see that the temperature inside the drum is not above 90°F. The basicity of the liquor may be increased by adding 1 oz. of soda ash to every 100 ounces of chrome liquor.

Tanned leather should be tested for complete penetration. For this, a portion from the thickest portion of leather is taken and its outline drawn by placing it on paper. It is then put in boiling water for 5 minutes. If there is no shrinkage and it does not harden then it is satisfactorily tanned. The tanned pelt may then be removed and left over in the wet condition. The pelt should not however get dry.

Shaving: After draining, the side is semidried and shaved on the 9th day. Shaving may be done by machines or by cutting knives. For hand shaving proceed as in the manner of fleshing. Shaving gives a smooth flesh side and also makes the leather uniformly thick. Shaving should be done very carefully.

Neutralising: The shaved hide is next washed free from salt and acids, which remain uncombined with the fibres. Washing is done in drums which are worked for about ½ an hour. Water is then drained out and the sides neutralised. This is done with alkali, the cheapest being soda ash, but the process is highly technical and unsafe and hence Borax 1–2% on the weight of the hide may be used. Complete neutralisation should be tested. Add 2 drops of Bromcresol purple solution 0·04% in alcohol to the cut surface, when the centre will be yellow tinted and the edges purplish. After neutralisation wash thoroughly in the drum by working the drum. Immediately start the next 2 processes of dyeing and fat liquoring.

Dyeing: Dyeing is done by dissolving ½ pound of dye of the required shade in boiling water, to every 100 pounds of shaved neutralised product. This also may be done in the drum and it takes ½ an hour for the dye to get absorbed in the fibre.

Fat liquoring: After drying is completed the pelts are removed from the drum and fat liquor is introduced into it. All these operations are done on the 10th day. Fat liquoring the next process is necessary to give a superior finish to the leather and to correct any incompleteness in tanning. It lubricates the fibres and gives the leather additional softness and pliability. It also improves the water proofing quality of leather.

A very convenient fat liquor is made by mixing Turkey red oil and Sulpholine P. $1\frac{1}{2}\%$ of weight of hide of each is taken, mixed and put in a drum and rotated. The hide are replaced and worked in the drum for $\frac{1}{2}$—1 hour. The hide if alkaline will not absorb fat liquor. When fat liquoring is completed then the wet hide on being pressed from the flesh side throws out moisture in the form of detached globules of water. If fat liquoring is not sufficient then there is a watery streak.

Setting: The hides are taken out and left for draining and then individually set. The object of setting is to remove the wrinkles and make the grains flat and to remove imperfectly absorbed fat liquor by pressure. The setting tool is a steel blade 6″ long by 3″ deep made of $\frac{1}{4}$″ metal fixed to a flat handle The hadle is held by both hands and the striker edge is made to travel along the leather surface squeezing out water and unabsorbed fat liquor. The leather thus becomes flat and smooth.

Drying and Samming: Chrome leather is then dried in the sun by hanging from ropes or by clamps or by laying on the lawn. After drying the leather should be made uniformly damp. This is called samming. To obtain uniform dampness the leather pieces are laid in pairs with the grain side opposing each other. Damped sawdust is uniformly mixed and a layer of it spread on the floor. Over this the flesh side is placed. Over the top of the flesh side again sawdust is spread and another pair of leather is laid and the whole covered with sawdust and left overnight. The above operations are done on the 11th day.

Staking: On the 12th day, the hides can be staked. Staking is just softening and is done by pulling the leather over a semi-circular steel blade by the right-hand while the left-hand presses the leather against the sharp steel edge. By working over and over the desired softness is obtained. Staking requires much skilled labour as the leather otherwise becomes humped on wavy.

Drying: After staking, drying of the leather should be proceeded with on the 13th day. For this the leather is laid on a board large enough for it, stretched fully and fixed to the board by nails. Again the leather should not be wrinkled when this is done. The leather is left for a day to dry.

Clearing and Seasoning: The next day with a 2—5% solution of acetic acid the surface of the leather is rubbed. The object is to remove surplus fat liquor or natural grease that may remain. Seasoning is then commenced. Seasoning is a top coating for leather which when rubbed with a friction glazer will produce the required gloss on it. A season can be prepared as follows:

Black.

1. Nigro sine. 1 oz.
   Black prepared pigment 1 lb.

   Dissolve the nigro sine in 1 lb. of boiling water and add the pigment. Keep separately. Other dyes should be used in place of nigro sine to obtain other shades.

2. Shellac 3 oz.
   Casein $\frac{1}{2}$ oz.
   Ammonia $\frac{1}{2}$ oz.
   Borax $\frac{1}{2}$ oz.

   Dissolve the shellac in the ammonia and casein in Borax with the least amount of water. Dissolve separately.

   Gelatine $\frac{1}{2}$ oz.
   Water 1 lb.

   Mix the gelatine solution with the shellac casein solution.

3. Linseed 4 oz.

Make mucilage by working up in 1 lb. of boiling water and strain.

4. Blood or egg albumin 1 lb. strain.

Mix 1, 2, 3 and 4 to make up to 3 gallons. It will be sufficient to give 2 coats of season to 40 sides. For light shades blood is not used. Egg albumin is used. The season is applied with a sponge or brush. After application the leather should be dried in a few minutes. The season is best applied on the nailed leather under the sun. In a few minutes the coat dries and becomes hot when it is ready for receiving the glaze.

Glazing: This is done with the help of a hand glazer. The glazer is made of hard glass and is rubbed on the grain surface with pressure when the leather becomes glossy. After this the surface is ironed with a hot iron as in ironing clothes. The heat and pressure makes the leather smoother and more shiny. All these operations are done on the 14th day.

The leather is again dried, seasoned, glazed and then trimmed and measured after which it is ready for sale on the 15th day.

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Grass Farming in the Kangayam Breeding Tract

BY

A. R. VEDANAYAKAM, G.M.V.C., B.V.SC.
Department of Animal Husbandry.

The Kangayam breed of cattle are extensively bred in Coimbatore district. Though in almost all the taluks in the district they are bred, the regular breeding tract is Kangayam in Dharapuram Taluk and about 10 miles radius around Kangayam. The systematic grass farming is practised in the Kangayam Sub-taluk. In the other parts of the district very rarely grass is grown. But in most of the places in Coimbatore district a small plot of waste land is set apart for grazing. In these waste lands Hariali and some other grasses grow of their own accord. People in these areas do not care for grass farming because the rainfall is greater than in the heart of the tract and cultivation of other cereal crops pay them better.

The common grasses found in the tract are *Kolukkattai* white (Cenchrus ciliaris) and black (C. Setigerns) *Venni Mattankay* (Dactyloctenium aegyptium), Ibi (Digitria marginata), Hariali (Cyanadon Dactylon), *Kuthiraipul* (Echinochloa colona), *Saranai*.

Leguminous plants found in the pastures are *cheppaneringi* (Indigo Ferenna phyla), *Kuttinarai payathankodi* (Phaseolus Tribolus). These grow naturally in the pastures.

In the pastures white babul trees (Acacia-Leucophloea) grow naturally or seeds are sown. These trees are not only useful for shade to cattle during the summer, but the fruits which are produced in large quantities, form a very satisfactory food for cattle during February and March when the grazing begins to get somewhat dry and scanty. This tree does not interfere with the growth of grasses immediately underneath as is the case, for instance, with the Tamarind. These trees check soil erosion to a great extent.

Kolukattai is the only grass which is systematically planted and grazed in the Kangayam tract.

All other grasses and legumes grow naturally in these pastures. Breeders in this area contend that the name *Kolukattai* is derived from *Kolukattai*, proof against plough-share. This grass is noted for its feeding value, in the Punjab and U.P. Anjan.

Soil: The best suited soil for *Kolukattai* grass is very loamy soil (*sambal mannu*) which is rich in lime. The other types of soils where it can be grown are red loamy soil friable black cotton soil, and soils rich in kanker. The type of soil on which this grass thrives varies with rainfall. Where the rainfall is low the heavier clayey soils are preferred. The Kangayam Sub-taluk has got an average rainfall of 25″ per year. In this area the soil is mostly grey loam or rich in kanker. In the other parts of the tract the soil is red loam friable, black cotton, etc.

Laying out the Pastures : There are two seasons for sowing *viz., Kar* (early) and *Paruvam* (late). *Kar* is the best season for sowing the grass because it gets a good start and makes the full use of the following *paruvam* rains and consequently stands the chance of coming through the following dry weather successfully. In Kangayam the land is well ploughed in the main season and the seed sown mainly with *cholam* as a nurse crop from August to October. As the *kar* rains are not certain in this area, this practice is common. In favourable conditions germination occurs in about 6 days after sowing. The north-east monsoon rains enable the grass to grow to a height of 3 to 4 feet. The height of the grass depends

on the soil and the rainfall. In these pastures babul trees grow naturally or in some cases seeds are sown. All the other grasses and legumes mentioned above grow naturally in these grass-lands. These grass-lands are fenced with enclosures varying from one to several acres. The fencing consists of live-hedges, *Mullu kiluvai* (Commiphora berryi). Once in 3 to 5 years the grass-lands are ploughed after a shower of rain and before the tussocks show signs of growth. There is little chance of the grass being killed by this operation unless soil is dry and rain holds off for a long period after ploughing is done.

Grazing : These pastures are left for 5 to 10 years. Animals are not allowed to graze into the pastures for a year after sowing as there is a considerable danger of growing plants being pulled out by the roots. Sheep, goats and horses are kept away from these pastures as they are close grazers and can do considerable damage. From the third year only regular grazing commences. A week or two after the rains the cattle are allowed to graze Poor ryots allow all their cattle to graze in pasture. But large stock-breeders, run their cattle on a regular grazing rotation. The legumes in the fields form a better feed with the grass than grass alone. In addition the grass benefits from the nitrogen accumulated in the legume root. In *kolukattai* pasture when there is young growth of grass after rains it produces excellent feed and cattle rapidly grow and fatten soon. They put on a sleek and glossy appearance. For young cattle grazing throughout the year, 5 acres is considered necessary. The Pattagar of Palayakottai allows on the average $3\frac{3}{4}$ acres per head for 9 months.

In most of the grass-lands in the heart of Kangayam tract, there are shallow wells or ponds in which the grazing cattle drink water whenever they want.

Factors of success of grass farming in this area are due to the following:

(1) Soil, (2) the climate and (3) the fencing. As regards soil and climate the conditions in the tract have already been described above.

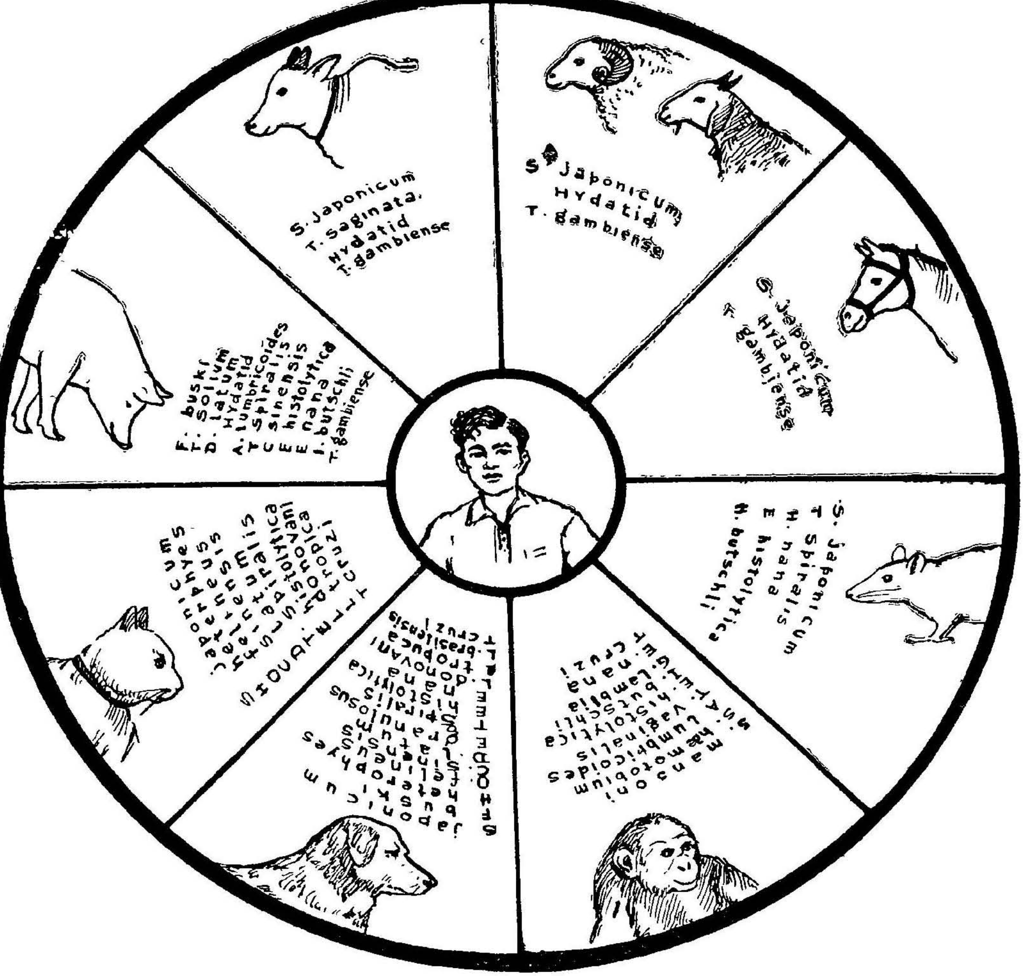
Fencing : This is common in the tract. High wind is common in this district and if the pasture is left bare and unprotected the rate of evaporation increases. The live-fencing and the white babul trees grown in the fields reduce the evaporation of moisture from the surface of the soil ; hence the abundant growth of grass and legumes.

On account of the fencing grazing is also controlled. The cattle can be moved from one field to another as occasion demands and thereby giving the grass a chance to recover and renew its growth. Separate fenced paddocks make the control of diseases easy. The live fence and the growth of white babul in the pasture area prevent the soil from erosion.

Conclusion: These are the ways in which the pastures are maintained in the tract. The ryots in the tract can improve the pasture by adopting the following few principles. The grass-land should be divided into plots by means of earthen banks taking into account the direction of the water course. This should be carried out judiciously so that the sloping land becomes level in course of years by the process of silting. The dung heap in the pastures should be disturbed as they are breeding places for many pests. For this shallow ploughing is necessary. The weeds should be systematically removed and disposed off as they rob the light, food and water of the grasses. Burrows should be closed in the pastures.

PARASITES OF ANIMALS COMMONLY AND OCCASIONALLY FOUND IN MAN

BASED ON LIST COMPILED BY W. H. WRIGHT



Host-Parasite Relations in Zoonoses

By

D. A. VICTOR, G.M.V.C., B.V.SC.
(*Department of Helminthology.*)

Many diseases are communicable to man from animals and the importance of zoonoses has been recognised only of late. Because of his close contact and intimate association with many domestic animals man exposes himself to the diseases and parasites found in them. The complete list of parasites transmissible from animals to man is indeed an imposing one. But here will be discussed only parasites that are quite commonly seen to be transmissible to man from animals, from the viewpoint of their mode of infection stage of infection and degree of infestation.

Parasites with man as the Principal Host, but occurring occasionally in lower Animals.

Parasites transmissible from man to lower animals are very much limited in number. *Endamoeba Histolytica* has been recorded fairly frequently in the lower primates but only rarely in dogs and cats. Ancylostome duodenale and Necator americanus, the common hookworms of man have been on rare occasions reported in dogs and cats. Strongyloides stercoralis occurs principally as a parasite of the human host and infrequently as a parasite of lower animals.

Parasites of lower Animals occurring occasionally in Man.

Many parasites may be included in this category. Apart from their host-specificity the chances of man exposing himself to infection with them is rather limited and this would probably account for the rare records of such parasitism occurring in man. There is a single recorded case of the cat tapeworm Taenia taeniaeformis being found in man. The incidence of the dog cestode Dipylidium caninum in man, especially among children is more frequent. In the case of the liver-fluke Fasciola hepatica the infective metacercariae are found on vegetation and man acquires the infection by eating such vegetation. The reported incidence of Fasciola in man must be due to his eating such infected water-cress in a raw state.

Parasites having their Larval stages in Animals and the Adult stages in Man.

In this group are listed the three large tapeworms Taenia saginata, Taenia solium and Diphyllobothrium latum. Cysticercus bovis, the larval stage of Taenia saginata occurs in the musculature of cattle and man acquires the infection by eating raw, pickled or undercooked "measly beef" containing these bladderworms. Cysticercus cellulosae is the larval stage of the tapeworm Taenia solium and it is found in the muscles of swine. Man gets the infection through eating "measly pork" in a raw, pickled or undercooked state. Macarthur (1933) has reported that British soldiers in India were commonly infested with Cysticercus cellulosa.

Diphyllobothrium latum, the broad fish tapeworm, infests numerous hosts besides man, including dog, cat, certain wild carnivores, the walrus, seal, sea-lion and the domestic pig. The final infective stage is the plerocercoid larva found in the muscle layers of a suitable fish host. Man develops the infection by consuming such infected fish in a raw, pickled or undercooked condition.

Parasites having their Adult stages in Animals and the Larval stage in Man.

These parasites are only accidental invaders of man—on the other hand, their entry into man is inimical to their perpet-

uation, as their life-cycle pattern then ends in a cul-de-sac. Prominent in this group is the dog tapeworm, Echinococcus granulosu which produces the dreaded "Hydatid Disease" in man. In passing may be mentioned the dog and the cat hookworms producing "creeping eruption" in man, and species of rodent and bird schistomes, the larvae of which cause the so-called "Swimmers' Itch." Diphyllobothrium mansoni is the tapeworms of dogs, cats and wild carnivores in the Sino-japanese region. The larval stage is found in the body musculature of frogs, snakes, birds or mammals and infection in man usually occurs as a result of the application, as a poultice of the flesh of any of the secondary hosts.

Parasites occurring in Man and Animals with Animals serving as Reservoir Hosts.

The human bloodfluke Schistosoma japonicum is common in China, Japan, Formosa, the Philippines, and the Celebes. Besides man it has been found in dogs, cats, swine, cattle, goats, field mice, moles and skunks. Horses are not affected, and two prevent dissemination of the infection through cattle, horses are substituted for cattle in agricultural operations, in certain areas of Japan.

Clonorchis sinensis, the chinese liverfluke occurs often in dogs, and cats and certain other fish eating mammals. Faust and Khaw (1927) state that lower animals are important reservoir host of this parasite in East Prussia.

Trichinella spiralis has been reported in man, swine, rodents, dog, cat and certain fur bearing animals. In this nematode both the adult and the infective larvae occur in one and the same host. The larvae are found in the voluntary muscles of the host and the life-cycle is completed when the infected flesh is eaten by another suitable mammalian host. The hog is the chief reservoir host for this parasite.

Among the protozoan diseases, Leishmaniasis and Trypanasomiases are important diseases communicable from animals to man. Kala-azar or Visceral lieshmaniases caused by Leishmania donovani found in Mediterranean countries, the Near East, South Russia and Turkestan, India, North China, the Sudan and certain parts of South America. In these areas "cutaneous leishmaniases" due to Leishmania tropica is commonly encountered. In both these cases dog acts as the chief reservoir host, though in the latter, small rodents, have also been incriminated as reservoir hosts, in certain areas. Dog is the reservoir host for Leishmania brasiliensis, the etiological agent of muco-cutaneous leishmaniases. But the greater incidence of this disease among forest workers would suggest that some forest dwelling animals, as yet unknown might be the principal reservoir hosts.

African "sleeping sickness" caused by Trypanasoma gambiense is perhaps largely maintained by game animals. However, the ease with which domestic animals such as sheep, goats, cattle and swine come to harbour Trypanasoma gambiense for long periods, make us suspect them as potential reservoir hosts for this trypanasome. Trypanasoma cruzi, the causative agent of Chaga's disease in South America has in its array of reservoir hosts dogs, cats, armadillos, mice, ferrets, opossums, the anteaters, squirrels, the wood rats and monkeys.

Considering the numerous opportunities available for the passage of prarasites from animals to man the small number of parasites actually found developing in man, must be attributable to some natural resistance on the part of man. It will be seen that among parasitic zoonoses, those communicable from dogs to man occupy a prominent place (vide chart). This is probably due to man's intimate contact with dogs and the freedom the latter enjoys in his home having access to the mess table and even to his bed. Fondling of these pets, dogs, or cats, leads to inadvertent ingestion of infected lice, fleas and also some helminth eggs sticking on to their coats. For instance, the incidence of human infection with Dipylidium caninum, the double pored cestode of canines, has been reported quite

frequently and the vast majority of these cases have been recorded among children. The points of contact between man and utility animals like cattle, sheep and goats, horses and swine are comparatively less and this is well indicated by the smaller number of parasites transmitted from these animals to man. And he succeeds in acquiring parasitic infection from these animals mostly due to his predatory habits.

The transmission of diseases between man and animals may well be attributed to his domestication of the latter. As undoubtedly the earliest of such animals, the dog helped him in his hunt for food and is now his closest companion, while the other animals such as cattle and pig were domesticated because they served as food themselves or as source of food. Thus, in the communication of parasitic diseases, the association between man and dog is physical and that between him and the food animals physiological. The subject of zoonoses is therefore essentially one of host-parasite relationships, man and animal together nurturing the same parasites.

Literature for further Study.

Barnett, Sir Louis, 1940, The incidence of hydatid disease in Newzealand and elsewhere Newzealand Med J. 39 (214) : 330-338.

Cort, W W 1928, Schistosome dermatitis in the United States. J A M.A. 90 (13). 1027-1029.

Faust, Carroll and Oo-Khaw 1927, Studies on Clonorchis sinensis (Cobbald), Amer. J Hyg. Monographic series 8.

Hoare, Cecil A 1944, Cutaneous Leishmaniases Trop Dis Bulletin 41 (5) 331-335.

Hull, T G. 1955, Diseases transmitted from animals to man Charles C. Thomas Publisher, Springfield, Illinois, U. S A.

MacArther, W P. 1933, Cyticercosis as a cause of epilepsy in man. Trans. Roy Trop. Med. & Hyg. 26 (6) 525-528.

Magath, T. B. & Mathieson D R. 1945, Infection of wild rats on Leyte with S. Japonicum. Naval Med. Bull. 45 (6) 1195-1202.

Wright W H. 1947, Animal Parasites transmissible to man. Annals of the New York Academy of Sciences Vol XLVIII (Art. 6) p 553-574

Wright W H. Leon Jacobs & Walton A C. 1943, Studies on Trichinoses. Public Health Reports 58 (35) 1293-1313.

Character is not ready made, but is created bit by bit and day by day.

—EDNA LYALL.

Integrity is the backbone of charater.

Our greatest glory consists not in never failing, but in rising every time we fail.

—GOLDSMITH.

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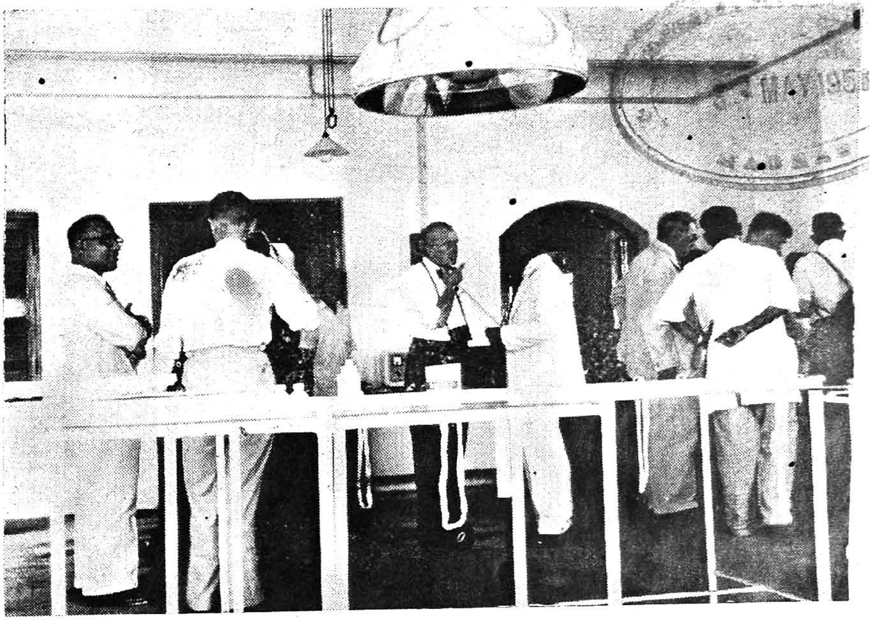
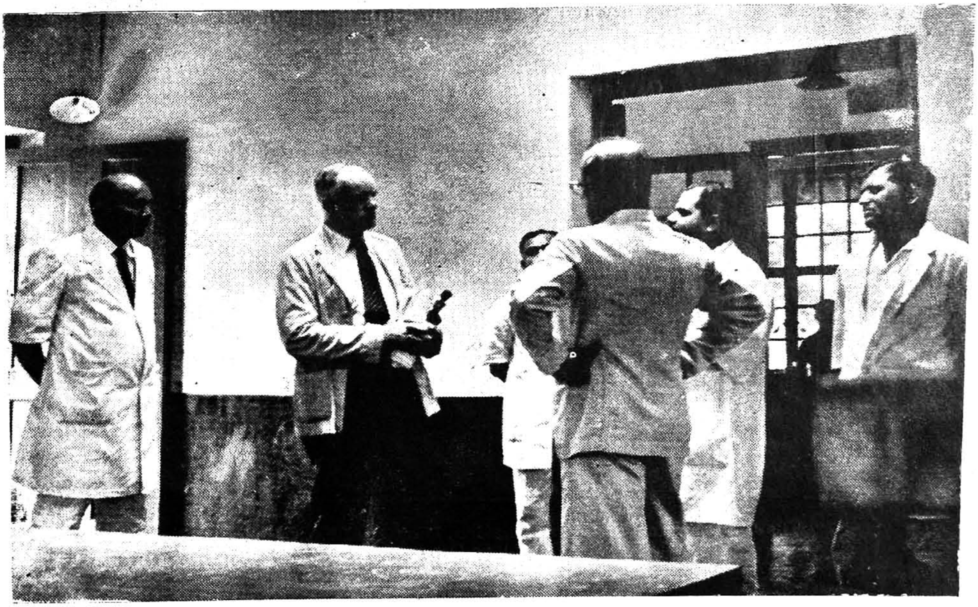
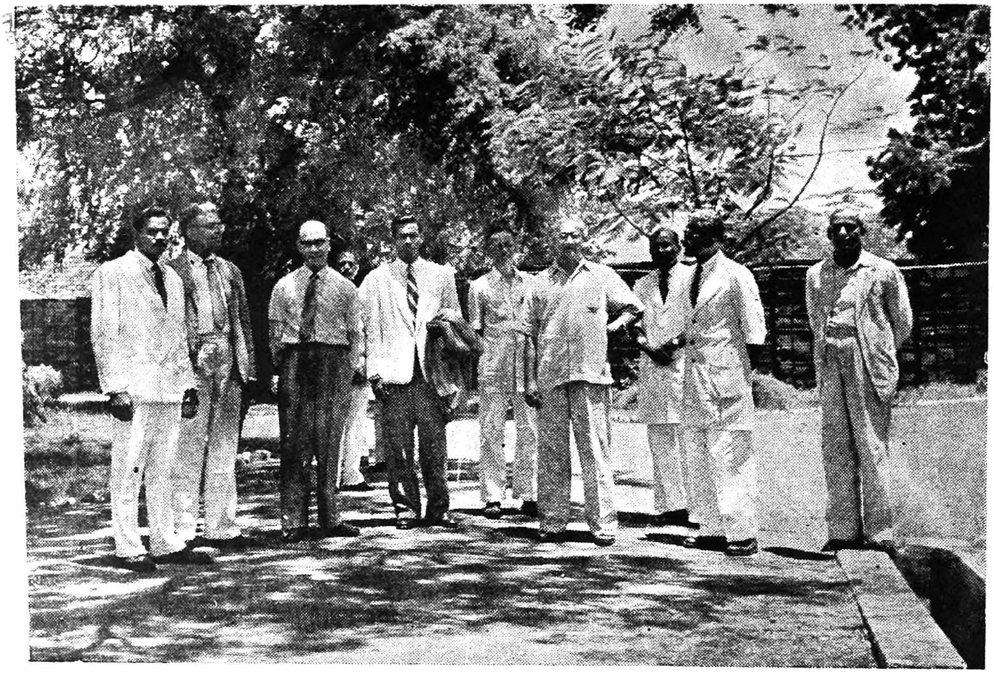


The F.A.O. Team, Principal and some members of the Staff in the Small Animal Surgical Theatre



Prof. Robertson of the Royal Veterinary College, Edinburgh (2nd from left) in the Autopsy Room



Prof. Yudkin, Prof. of Nutrition London University (3rd from left) with Director of Animal Husbandry and some members of the Association.

Garden Party at Raj Bhavan—Guindy.

The Governor and Sri C. Subramanian, Minister of Education with the Veterinary Group.

Amyloidosis in Horses used for Antitoxin Production

By

R. Krishnan, G.M.V.C., B.V.SC.
Department of Pathology.

Introduction :

Amyloid infiltration occurs in the connective tissue particularly the intima and media of small arteries and beneath the endothelium of capillaries. It is of interest to note that the exact composition of this amyloidis not yet definitely proved. Rokitansky called it 'lardaceous disease' in consequence of the pallor and greasiness of the affected organs. The name was originally given by Virchow as the material gave the typical iodine reaction *i.e.*, turning yellowish red with iodine and turning to blue or violet colour when sulphuric acid was applied. Later work showed that amyloid belonged to the group of glycoproteins, in which carbohydrate ester chondroitin sulphuric acid becomes attached to globulin and that this polysaccharide group present is responsible for the iodine reaction. In this connection it is of interest to note the following points.

Nature of Amyloid :

1. Amyloid material is closely related to many substances which include (*a*) heparin, a polysaccharide sulphuric acid compound which prevents clotting (*b*) chondroitin sulphuric acid present in the cartilage (*c*) hyaluronic acid present in embryonic connective tissue and young fibrous tissue and (*d*) mucin. The relation of amyloid to these substances leads one to think that amyloid may be the abnormal product of repair.

2. The condition is said to occur in many suppurating conditions and chronic leukaemias which suggest that it might be a breakdown product of leucocytes, as suppurative conditions increase tendency to thrombosis. Again hyaluronic acid and chondroitin sulphuric acid possess marked ability to unite with proteins forming gels and this leads one to think that this infiltration might be some disorder of enzyme system as the hyaluronidase.

Factors associated with its Formation :

It is said that early serologists concerned in antitoxin preparation in horses noted generalized amyloidosis in a majority of animals after many months of injection. No particular toxin only was associated with this and this led one to believe that amyloidosis was due to antibody response than due to toxaemia (Hjärre. A. 1933). Sen (1951) has pointed out that rupture of liver has not occurred in any of the horses used for antitetanus serum production by a pharmaceutical firm. Amyloidosis is also noticed in these other conditions.

(*a*) Prolonged suppurative conditions as in caries, pneumonia, pleurisy.

(*b*) Chronic bacterial diseases as tuberculosis, glanders.

(*c*) Experimentally in mice following inoculation with pyogenic organisms.

Observations of Amyloidosis at Autopsy :

From 1949-55 post-mortem has been conducted in about 56 horses used for antitoxin preparation. Out of these only in 13 cases some evidence of amyloidosis has been noticed. In four cases there was rupture of the liver. In 8 horses the spleen was found to be rubber-like in consistency and the trabecular markings were prominent. In one horse both liver and spleen were rubber-like. In a recent case amyloidosis involving the spleen and liver was detected in a 22 year old Bay Australian gelding.

Spleen was rubber-like in consistency and enlarged but the liver did not show any of the usually described evidence of amyloidosis.

From this case materials were stained with the special stains, commonly in vogue for staining amyloid and a few are discussed here. Both the liver and the spleen in this case showed evidence of amyloidosis on microscopical examination.

Methods used for Staining Amyloid:

1. Routine haemotoxylin eosine staining on paraffin sections. The amyloid areas take a dull pink colour.

2. Mayer's stain involving the use of crystal violet :—Amyloid materials (and foetal cartilage) display metachromatic staining with crystal violet taking a rose pink colour. It is known that this is due to the tautomeric behaviour of the dye molecule and not the mixed composition of the dye as was formerly thought. Here it may be noted that when this dye was added to a neutral solution of chondroitin sulphuric acid a rose pink colour was obtained. This might account for the amyloid taking the pink colour as it is commonly supposed to contain chondroitin sulphuric acid.

3. Benhold's congo-red stain for amyloid: In this staining method amyloid areas are stained red. This method is based on the fact that amyloid material is capable of absorbing congo-red and this is also made use of in diagnosing amyloidosis during life by injecting the dye intravenously and estimating the amount absorbed. When about 60% of the dye is absorbed within an hour the patient is declared to be suffering from amyloidosis.

Summary :

1. Some interesting features of the still unknown chemical composition of amyloid, cause of amyloidosis etc., are discussed.

2. Cases of amyloidosis have been noticed in horses used for antitoxin preparation. The changes observed in the spleen were more or less identical and typical of those described in literature. While in the liver the changes observed were not always consistent at least in the cases so far noticed and did not always conform with those described.

Acknowledgment :

I thank Dr. K. P. Chandrasekharan, G.M.V.C., B.V.SC., Professor of Pathology for the kind help and guidance he has given me in preparing this article.

References :

1. Anderson—Pathology.
2. Boyd, W.—Text-book of Pathology. 6th Edition 1953.
3. Carter, D. B.—Basic Pathology and Morbid Histology.
4. Payling Wright, G.—Introduction to Pathology.
5. Sen, M. R. (1951)—Indian Veterinary Journal, XXVII. 258.

Culture is to know the best that has been said and thought in the world.

—MATHEW ARNOLD.

Must is a hard nut, but it has a sweet kernel.

—ANCIENT PROVERB.

The Pathology of Schistosomiasis in Animals

BY

C. R. KRISHNAMURTHI, B.V.SC.

Department of Parasitology.

The bulk of literature on schistosomes has been peculiarly confined to the morphology and life-history of these parasites and the amount of available literature on the pathology is comparatively meagre. It may not be an exaggeration to say that the pathogenesis caused by these parasites has received a step-motherly treatment by most research workers, in spite of the fact that the scope for research work on their pathology, symptoms and treatment etc. is very vast and the field itself still remains unexplored completely. Taylor (1938) rightly observes that the logical approach to investigation on parasitism is to begin with the disease and then follow with the studies on the parasite which causes it. Progress in veterinary science is not advanced by minute studies on parasites without reference to their pathogenicity.

The general pathology of schistosomes may be summarized briefly as follows. The adult parasites cause irritation especially in the egg-laying stage. They suck blood and cause anaemia with its sequelae. The eggs are surrounded by infiltration of leukocytes especially eosinophiles, leading to the formation of characteristic abscesses—pseudotubercles. The toxins secreted by the parasites cause congestion of various organs and increase in fibrous tissue in spleen and lymph glands. In the liver, the abscesses become encapsulated and finally calcify. In gross infections, pneumonia is caused by their passage through lungs. There is diarrhoea, with blood aud mucus. Abdominal pain, fever, progressive anæmia are other symptoms observed. The cercaria of certain species of animal schistosomes produce dermatitis in man known as cercarial dermatitis or schistosome dermatitis, which has become a vexing problem on some fresh water bathing beaches in various countries e.g. *Cercaria elvae, C. stagnicolae, C. physellae*, cercaria of *S. douthiti, Trichobilharzia ocellata* and *S. spindalis*. Schistosome dermatitis has also been recorded in Mysore State, by Bhalerao (1948). The resistance of man, an abnormal host to these cerceriae explains the severity of the reaction in the skin. Its nature indicates that the cercariae, are walled off by the host and destroyed in the epithelial layers of the skin. We shall now consider in detail the pathology of a few schistosomes in India.

1. **S. nasalis**:—The first reference to the so-called "snoring disease" would appear to be by Jaya Singh Raj 1910, though subsequently it was recorded by various workers (*viz*) Cooper 1931, Oxspring 1931. Krishnamurthi (1922) was the first to demonstrate a characteristic ray fungus by an examination of the histopathologic section of the lesions. The same author in 1927 suggested the etiology of this disease to be a rhinosporidium. Cooper (1923 and 1931) recovered a pure culture of a streptothrix organism from the lesions. The year 1932 is a land mark in the history of schistosomiasis in our country because then three workers—Bhalerao, Datta and Malkani – working independently, recorded schistosome worms in the nasal veins of cattle. Datta 1932, describing that bovine nasal granuloma is a clinical manifestation of schistosomiasis, observes that there exists in India another separate and distinct affection of the nose of cattle and horses (*viz*) rhinosporidium, as already described by Krishnamurthi (1927 and 1931). The latter lesions are more fragile and pedunculated unlike the former which are elevated masses and intimately connected to the subjacent tissues by a broad base. The confusion as to the exact identity of *S. spindalis* Montgomery 1906 and the schistosome of nasal granuloma ended when M. A. N. Rao (1934) described the nasal schistosome and proved it to be an entirely different species which he named *S. nasalis* Rao, 1934.

Constant running down from the nostrils, frequent sneezing, redness of nasal mucosa and coryza mark the onset of the disease. As the nasal mucosa becomes œdematous, a blowing sound is heard during respiration due to narrowing of the nasal cavity. Raised patches with tiny abscesses appear on the mucosa in about four weeks. The lesions of the disease first make their appearance at the alar margin of the nose and gradually extend posteriorly. The nasal discharge becomes abundant, mucopurulent and reddish, as the disease progresses and sessile growths become more pronounced and a snoring sound is produced during respiration. In discussing the histopathology of bovine nasal granuloma Datta (1932) states that whereas the urinary and intestinal forms of bilharziasis are frequently associated with malignancy and formation of polypoid growths, the essential histology of nasal schistosomiasis is simply that of granulation tissue. The epithelium covering the active lesions is ulcerated due to the pressure exerted by the ova attempting to work their way out. Early growths are made up of vascular young connective tissues and fibroblasts in activity whereas older growths are less vascular and contain fibrous tissue. Eosinophilia, a notable feature of nasal granuloma may be localised in the periphery of the follicles or diffusely scattered. The formation of a bilharzial pseudotubercle, which was misunderstood by previous workers for actinomycotic granules surrounded by a ray fungus is described in detail by Datta (1932). Apart from the changes in the connective tissues of the nose, the blood vessels show endarteritis due to bilharzial toxins. The blood vessels in deeper sections contain mature healthy worms.

There seems to be much controversy regarding the incidence of *S. nasalis* in buffaloes. Malkani (1932) and M. A. N. Rao (1932) have recorded the incidence of *S. nasalis* in goats and buffaloes. Sen (1949) states that 87% of the buffaloes he examined had eggs of *S. nasalis* but none of them showed any symptoms. Abdus Salam and Sarwar (1953) recorded the occurrence of *S. nasalis* in 48·9% of buffaloes in the Punjab, where nasal granuloma has never been observed in cattle. Very recently, Rao and Mohiyudeen (1955) report that the lesions of the disease in the buffaloes are in the deeper part of the nasal cavities not to be visible from outside. M. A. N. Rao (1935) is of the opinion that buffaloes get a partial immunity to *S. nasalis* owing to the infection with *S. spindalis* acquired on account of their aquatic habits. Edwards and Sinton (1940) have recorded nasal granuloma in equines due to *S. nasalis*.

Christopherson (1918) was the first to point out the efficacy of tartar emetic in human bilharziasis in Sudan. Parthasarathy Naidu (1921) first proved the value of tartar emetic in curing nasal schistosomiasis in India. Rao and Mudaliar (1936 computed suitable doses of antinomy tarta) ratum for treatment of nasal schistosomiasis. They recommended 1·5 grains per 100 lbs. body weight for 6 days or 2·5 grains on alternate days given intravenously.

2. **S. indicum** :—Nodulated portal cirrhosis of the horse's liver associated with intractile debility had long been one of the hard nuts to crack. Smith (1885) writing on "calcareous degenerations in the horse" could not determine the etiology of the condition but stated that there was some defective secretion of lime from the body—leading to degenerative changes in the lung, liver and intestines. He was, however, of the view that this is not the result of parasitic invasion. The so-called internal bursati involving lung, liver, spleen etc., has been mentioned even in very early literature. Lingard (1905) stated that calcareous nodules were of frequent occurrence in the horse—small filarial nodules as he calls it—occurring in the cortex of kidney and lungs. Regarding the etiology of these nodules several theories have been put forth (*viz*) nucleus of a ovum of a distome (Oreste and Ercolani) ; produced by embryos of nematodes, carried by blood (Mazzanti). Montgomery (1906) observed pearl-like nodules in enlarged livers in all cases of

equines from which he collected *S. indicum*, though he was inclined to ascribe them to filarial embryos. Datta (1933) proved that this peculiar affection of equines in India was a clinical manifestation of schistosomiasis the predilection seat for the deposition of the ova being the distal portions of the intestinal tract, particularly the large colon and rectum and liver.

An exact detailed account of the symptomatology of the disease could not be given, since very rarely is this disease recognised at an early stage and by the time the horses are presented they would have already succumbed to the disease and complicated by secondary sequelae. The cercarial infection takes place either through the cutaneous route or more probably through the gastro-intestinal tract. The disease beginning with insignificant symptoms such as urticarial rash, occasional loose faeces, lethargy and unthriftiness for no apparent cause is not likely to be recognised. The administration of anthelmintics and tonics will not improve the condition to any appreciable degree. Sub-acute glanders and T. B. can be eliminated by biological tests. As the disease progresses there is œdema of the dependant parts. The enlarged liver can be palpated per rectum. The patient has the appearance of a gravid mare. (Williams, 1914), due to the enormous distension of the liver. This sort of persistent debility progresses until death. The geographical distribution, the clinical syndrome and the finding of the characteristic ova in the fæces aid diagnosis. The disease seems to be confined to the northern parts of India and in old animals, though recently it has been encountered in a milder form in bovines in Kurnool, Chittoor and Nellore Districts.

Numerous minute grey or whitish nodules resembling miliary T.B. are seen in the liver. Individual nodules, if crushed and examined after treatment with KOH reveal the ova. Large intestine and to a less extent small intestine are also involved. However, malignant neoplasms as is frequently encountered in intestinal bilharzialis is not seen in this equine infection. The ulcers on the mucous membrane are characteristic being generally minute, circumscribed and their surfaces covered by a black deposit. The veins on the peritoneal surface of the gut get thrombosed and stand out as rigid linear elevations. The mesenteric and other lymph glands are also involved.

In *S. indicum* infection of sheep and cattle the ova have been found almost exclusively in the mucous membrane with practically no tendency to nodule formation, the actual lesion being more cellular than fibrous and not calcareous at all, whereas in equines the ova of *S. indicum* are wholly restricted to the layers of tissue situated beneath the mucosa. Donkey, camel and goats are other hosts where it has been recorded.

3. **S. spindalis** : *S. spindalis* is one of the schistosomes whose pathology, despite its wide occurrence, has been meagerly worked out. The parasite has been first described by Montgomery in India in cattle 1906. It has also been recorded in buffaloes, goats, sheep and dogs. Its life-history has been worked out by Liston and Soparkar (1918). They state that *S. spindalis* affects only the alimentary tract or its appendages and its ova are voided in the faeces. Fairley and Meckie (1925) transmitted the infection of *S. spindalis* to buffaloes which they believe to be the natural host of the parasite in view of the aquatic habits of water buffaloes and the frequency with which they inhabit water tanks known to harbour infected molluscs. Describing the pathology they observed bilharzial pseudotubercles in the liver. There was leukocytic infiltration. Intravascular deposits of ova were frequently observed in the infiltrated clot and in a few instances disintegrating schistosomes were demonstrated. Very recently, Kalapesi and Purohit (1954) discussing the histopathology of morbid tissues from a case of natural infection with *S. spindalis* observe, besides the usual lesions in the lungs, liver, intestines, focal necrosis in the liver paranchyma, which

they attribute to the circulating toxins. M.A.N. Rao (1933) predicted that there is reason to believe that some cattle die of portal and intestinal bilharziasis and apparently the disease is not recognised as such. Experimentally it has been proved by M.A.N. Rao that pathological conditions are brought about on liver, small intestines due to *S. spindalis* which is likely to undermine the health of the animals. Kulkarni, S.R. Rao and Chaudhari (1954) have recorded two unusual outbreaks in bovines associated with heavy mortality due to *S. spindalis* infection in Bombay State. Cattle were more susceptible whereas buffaloes were refactory. Sheep and goats have also succumbed to the infestation. In the cases autopsied by these authors there was generalised infestation which was very peculiar to the normal behaviour of *S. spindalis*. Cirrhosis of the liver with sub-mucous nodules, nodules in the intestines, thick brownish green bile with gall stones in the gall bladder, enlarged and inflammed lymph glands, highly distended bladder with yellowish coloured urine were the lesions observed these authors in cases naturally infested with *S. spindalis*. However the separate disease entity, if any due to this parasite, so widely prevalent has yet to be studied in full.

4. **S. incognitum etc** : *S. incognitum* has been recorded in pigs and dogs (Rao and Iyer 1933; Swaminathan 1934; Rao and Iyer 1935) giving rise to persistent diarrhœa. *S. nairi* has been recorded in elephants. (Mudaliar and Achary 1945). The existence of *S. bovis*, *S. japonicum* and other species of schistosomes in India is doubtful and hence their pathology is not a practical problem.

Discussing the etiology of enzootic bovine hæmoglobinuria Datta (1934) is of the view that schistosomes are not guilty of causing the lesions, though Sonsino (1876) is reported to have collected 30 schistosome worms. (*S. bovis* or *S. crassa*) from the bladder of an ox which presented intestinal lesions and typical lesions of hæmaturia in the bladder. In this connection it may be noted that in Egypt Piot Bey (1918) recorded a case of bilharziosis as the cause of a perforating ulcer of the bladder in a calf and in India Rangaswamy (1922) reported a case of hæmaturia in Nilgris in the urine of which animal schistosomes are stated to have been seen. However schistosomes cannot be accepted as the causal agent of bovine halmaturia without further proof. Malkani (1937) observes that the disease "Kumri" is a definite morbid entity because the majority of the animals affected present uniform symptoms and schistosomes are present in the liver in every case of Kumri.

Discussion:—Lombard (1934) expresses the opinion that the parasites are more frequently the cause of cancer than has been suspected. He thinks that the parasite is frequently eliminated after inducing cancerous changes. Writing on "helminth parasites and neoplasia" Schwabe (1955) discusses the possibility of cancer of urinary bladder of man with the eggs of *S. haematobium*. Other observers have previously suggested such a possibility and have claimed a causal relationship between *S. haematobium*, *S. mansoni* and *S. japonicum* and human cancer and S. *bovis* and bovine cancer. Further the presence of the ova of *S. nasalis* by Rao (1935 and 1943) in cases of horn cancer in India strengthen the argument that further researches on the subject may ultimately prove schistosomes to be one of the causal agents of cancer in animals. Statistical data on the relationship of cancer in animals associated with schistosomiasis (be it *S. nasalis* or *S. spindalis*) will help to solve the problem. Secondly, as already suggested by M.A.N. Rao (1939) cercarial infection acquired while bathing in ponds containing schistosomes of animals may be one of the causes of non-alcoholic cirrhosis of liver in man India. This, as also the cercarial dermatitis in man observed commonly in other countries are two public health problems for which animal schistosomes may by responsible. In conclusion it may be said that the pathology of *S. spindalis* and *S. nasalis* in buffaloes and other animals widely occurring in our

country, and the pathology of canine schistosomiasis are problems yet to be pursued in sufficient detail.

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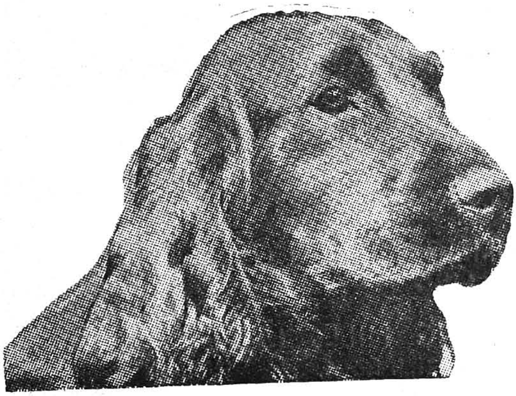
References :

1. Abdus Salam and Sarwar (1953). Proc. of 15th Inter. Vet. Congress Part I. p. 18-23.
2. Bhalerao (1932). I J.V.Sc. and A. H. II (4) p. 338-356.
3. Idem (1948). Pres. Address. 35th Indian Sc. Cong.
4. Datta, S.C.A. (1932). I.J.V.Sc. and A.H. II (2) p. 131.
5. Idem (1934). Ibid. 4 (4) p. 1.
6. Fairely and Mackie (1925). Far East. Assn. Trop. Med. 423-446.
7. Jayasingh Raj (1910). I.V.J. 1910. p. 419.
8. Krishnamurthi (1922). Mad. Vet. Jl. 15. p. 2-7.
9. Idem (1931). Proc. 18th Session Indian Science Cong. p. 356.
10. Kalapesi and Purohit (1954). I. V. J. 30. p. 336-340.
11. Kulkarni, S.R. Rao and Chaudhari (1954) Bombay Vet. College Mag. 1953-54. p. 3-15.
12. Liston and Sorparkar (1918). I. J. Med. Res. 6. p. 567-569.
13. Malkani (1932). Vet. Rec. 12. p. 416.
14. Malkani (1933) I.V.J. 9 (3). p. 257-277.
15. Mudaliar and Achary (1945). I.V.J. 22. (1).
16. Parthasarathi Naidu (1921) Mad. Vet. Jl. 19. p 2-6.
17. Rangaswami (1922). Mad. Vet. Jl. 14.
18. Rao M.A.N. and Iyer (1933) I.J.V.Sc. and A.H. 3. (4). p. 321.
19. Rao M.A.N. (1934). I.J.V.Sc. and A. H. 4. (1) p. 1-28.
20. Idem (1935). Ibid. (5) 3. p. 265-273.
21. Rao M.A.N. and Mudaliar (1936) Ibid 6. (4) p. 332-345.
22. Rao M.A.N. and Iyer (1935). Ibid 5. (1) 23-27.
23. Rao M.A.N. (1943). Ibid 13. p. 178.
24. Idem. (1939). I.V.J. 15. p. 349.
25. Rao and Mohiyuddin (1955). I.V.J. 31. 5. p. 356-358.
26. Swaminatha Iyer (1934). I.V.J. XI (3) p. 112-114.
27. Sen. (1949) I.V.J. 25. p. 452-456.
28. C.W. Schwabe (1955). Am. J. Vet. Res. Vol XVI No. 60. p. 485-487.



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Lucerne—Its Cultivation & Feeding Value For Livestock

BY

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I. Introdution :

(*a*) **Historical** : It hails as one of the oldest plants of the world indirectly serving mankind from prehistoric days. Its existence in Greece has been traced upto 470 B. C. by historians like Pliny and Strabo. From the days of Roman Empire this plant has been cultivated mainly for forage.

The word " lucerne " might have been derived from the valley called " lucerna " of Italy or might be a name of Arabian origin which would have undergone modification by usage. From its botanical name " Medicago sativa," one has to wonder whether it is derived from the Greek " Medicai " or latin " Medica."

(*b*) **Homeland** : The original home so far traced out seems to be Greece, Persia, Arabia, Central Asia and Ladok valley.

(*c*) **Botanical description** : It is a perennial legume characterised by a semi-woody base with a tap root penetrating to different depths in the soil giving off numerous lateral and fibrous rootlets. Stems are erect, the height ranging from 1 to 2 feet. The arrangements of leaves are in alternate and are in threes. The flower is a raceme, purplish in colour. The pods are twisted spirally containing numerous small kidney shaped seeds.

II. Details of cultivation :

(*a*) **Soil texture and climate** : Limy soil capable of good drainage with a mixture of clay and loam is said to be the best. A warm climate of low humidity suits well for its growth.

(*b*) **Preparation of the land** : A good deep initial ploughing followed by two or three thorough tillage is absolutely essential for a good standing. Two to three tons of lime per acre may be used for preparing crop as a top dressing on soils poor in lime. After ploughing, harrow is applied for the destruction of sprouting weeds. Then ridges and furrows are formed, the ridges being 12″ apart. The ridges where the seeds are sown should be well supplied with moisture at the sowing time. This method of growing in ridges helps in easy removal of weeds that come up and smother the young growing lucerne.

(*c*) **Sowing** : Seed rate varies from 10 to 25 lbs. per acre depending on the quality. While sowing, it should be borne in mind that the crop should be given a good standing before the hot weather commences. A light covering of the seed with soil is more than sufficient, as the deep sowing hampers the germination percentage. On a virgin soil where lucerne is grown for the first time, scattering the soil of a lucerne field over the sown ridges helps in giving a good stand for the lucerne, as it supplies an ample amount of the needed type of nitrogen collecting bacteria—bacterium radicicoli.

(*d*) **After care** : Aeration of the soil, keeping down the growth of weeds and provision of sufficient and frequent but moderate irrigation are some of the salient points to be borne in mind.

(*e*) **First cutting** : American investigators have shown that cutting before bloom not only thins the stand but also weakens the plant. This has been our experience as well. Any how, the blooming stage is considered as the time for the first cut, which is done after leaving a few inches of the stem from the base.

From the view point of chemical composition and digestability, Willard in Kansas compared lucerne hay cut at 3 stages—namely when about 10% in bloom; when about 100% in bloom; and in full bloom. The first mentioned was found richer in ash, protein and fat than that produced by later cuttings, while the crude fibre and nitrogen free extract increase in percentage as the plant matures.

(*f*) **Number of cuttings and its effect on quality**: It depends on factors like nature of growth, soil, climate and irrigation. At this college, it is found possible to take 9 cuttings in a year, leaving the first three months for growth to come in bloom and then cutting them at an interval of 30 days between two consecutive cuttings. The effect of the number of cuttings on the chemical composition and quality of the plant has not yet been studied here on a large scale to draw conclusions.

III. In considering, the usefulness of lucerne, commonly called Alfalfa, in the feeding of livestock it may be seen that it is reckoned as one of the foreranking forage crops because of the following facts.

(*a*) It is a perennial legume. It remains for a longer period in a land if proper initial precautions are carefully taken.

(*b*) In areas of limited rainfall considerable promise of satisfactory yield of greens or hay is assured if cultivated in rows.

(*c*) In irrigated regions of high altitudes, the practice of growing alfalfa with timothy grass or growing with dusum wheat in double rows, 40 inches apart promises a high yield of greens.

(*d*) Cost of maintenance of the land under lucerne is comparitively low.

(*e*) Yields highly palatable and nutritious fodder.

(*f*) The out-turn of yield in terms of its nutritive value per acre is high.

(*g*) In considering the economics of cultivation, it compares favourably with many of the commercial crops.

IV. These foregoing factors of nutritive and economic importance of lucerne, have made the livestock husbandrymen, to employ it usefully, in different forms, in the feeding of livestock.

Some of them are enumerated below:

(*a*) **Alfalfa pasture**: Light or moderate pasturing on old fields of lucerne has been the practice in United States where hay commands a good price. Heavy pasturing injures the standing of the crop. Hogs seem to be the best livestock that can least injure the alfalfa pasture. Allowing cows or sheep to pasture on alfalfa wet with rain may cause the danger of bloat. For such animals fields of mixed alfalfa and grass seem to be better lands for pasturing.

(*b*) **As soiling crop**: For dairy cows, it is the best suited and nutritious soiling crop so far known. For poultry, alfalfa greens, cut and hung in bunches in the runs serve as good green feed.

(*c*) **Lucerne silage**: The low tonnage and the high protein content of the crop make it a poor substitute both in quantity and quality for a good silage. However, mixing them well with corn plant seems to make a silage of good quality. Even though the feeding value of lucerne silage is considered to be very high, it is better to convert the excess of green lucerne as hay than to make it as a poor quality silage.

(*d*) **Lucerne hay**: Finely ground alfalfa is a bright pea coloured powdery stuff which is very convenient to use in mixed feeds with least wastage. It finds a place in the feeding of hogs and poultry.

(*e*) **Alfalfa straw**: In an area where lucerne is mainly cultivated as a seed crop, alfalfa straw finds a place in the feeding of livestock even though the mature stem and dried leaves are commonly considered as

less valuable from the feeding point of view.

A glance at the composition and the percentage of digestible nutrients of some of the different products of lucerne will bear an ample testimony of its high utility as the best nutrient available in nature, for feeding livestock economically, for better health and increased production.

Composition and Nutritive Value of Lucerne in different forms

	Average composition percentage as shown by analysis.						Digestible nutrients, per cent					Total Ash %	CaO%	P_2O_5%	K_2O%	Cl_2%
				Carbohydrates						Carbohydrates						
	Dry matter	Protein	Oil	Soluble	Fibre	Ash	Crude Protein	Pure Protein	Oil	Soluble	Fibre					
Green Lucerne (in early flower)	24.0	4.1	0.4	9.9	7.2	2.4	3.1	2.0	0.1	6.6	3.2	2.4	0.96	0.12	0.43	0.08
Lucerne Silage	16 9	3.7	1.4	4 7	5.0	2.1	2.5	1.5	0.7	3.3	2.1					
Lucerne hay (before flowering)	84.0	16.2	2.4	31.1	27.0	7.3	12.1	8.1	1.1	21 1	11.3					
Lucerne leaf Meal (American)	91.0	21.4	1.9	40.6	16.0	11.1	16.3	14.7		31 5	7.9					
Lucerne hay (in ½ flower)												8.0	2.74	0.51	1.52	0.34

References.

1. Rations for livestock–Bulletin No 48 of the Ministry of Agriculture, England.
2. Forage plants and their culture–by Piper.

A life of sacrifice is the pinnacle of Art.

—MAHATMA GANDHI.

Character is property. It is the noblest of possessions.

—SMILES.

Work is the grand cure of all the maladies and miseries that even beset mankind.

—CARLYLE.

Principles of Physio-therapy
(Extracts)

By

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The employment of physical energies forms an essential part of the present day treatment of diseases, injuries and of neoplasms. Heat, light and mechanical energy can be conveyed to the tissues by sun light and artificial sources of radiation and by various forms of electrical currents. Physical energies acting as stimulative or sedative forces from outside, help to relieve pain and inflammation, attenuate germs, restore normal function and improve the condition of the entire system.

The development of various physical methods of treatment dates back to the times when light, baths and massages were used, culminating to-day in the therapeutic uses of the modern forms of electricity and radiant energy. Physical measures are used widely as a part of a well planned general therapy which includes medicinal, surgical hygienic and dietetic measures.

Physical therapy rightfully forms part of the practice of medicine and surgery. Physical therapy can not be practiced independent of general medicine and surgery for it must be applied with a broad knowledge of clinical diagnosis.

Effects of Physical agents on the Anima body.

The effects on the animal body may be divided into two groups : (1) Primary effect on the body in a physical or chemical sense. (2) A secondary effect in a physiological sense. Either of these may be local or general : very often a combination of both effects will occur. Heating of the body or its parts can be produced through the medium of water, by an electrical current or by radiant energy ; mechanical effects can be obtained by massage by hand or by a suitable electric current.

The following table shows a classification of various physical agents on the basis of their primary physical effects :

Physical Agent.	*Primary physical effect.*	*Secondary physiology effects*
Hot water Hot air Incandescent lamps Diathermy Sun	Thermal	Hyperaemia Relief of pain Relaxation of tissues Attenuation of germs Reflex stimulation
Cold water	Caloric	Contraction of tissues Reflex stimulation
Roentegen-ray Radium	Physico Chemical	Contraction of tissues Molecular disintegration
Galvanic Current	Electro Chemical	Vasomotor stimulation and metabolic.

Low frequency, interrupted and alternating currents	Electro kinetic	Muscle and tissue contraction Increase of venous and lymph flow.
Vibration Massage	Kinetic	
Sun Heated metals Carbon arc Mercury vapour	Photo chemical	Dermatitis Pigmentation Activation of ergosterol Increase of cell count and solid contents of blood.

Scope of physical therapy.

There are some obvious advantages in employing physical remedies. Usually they can be directly applied to the affected parts and as a rule they give immediate relief. There is no danger of habit forming as is the case in the use of certain drugs. In some instances physical measures will enable the clearing up of conditions apparently requiring an operation. Among the many conditions in which physical measures prove of definite value are traumatic conditions, both acute and chronic ; the various forms of arthritis and rheumatoid conditions, many forms of paralysis and other organic and functional affections of the nervous system and many skin diseases. In every day veterinary practice there is scope for the employment physical methods particularly in canine practice though the field offered may not be as extensive as in the medical practice.

The therapeutic currents that are ordinarily used are the Galvanic current, the Faradic current and the Diathermic current. Their important physical characteristics are tabulated below :

Current	Mode of flow	Approx frequency	Voltage	Amperage	Physical effect
Galvanic	unidirectional constant	..	low	medium	chemical
Interrupted Galvanic	unidirectional surge	upto 100 per sec.	,,	,,	chemical and dynamic
Slow Galvanic (Sinusoidal)	slow alternating waves	3 to 90 per min.	,,	,,	,,
Faradic	Rapid assymetric alternating surges	about 100 per sec.	medium	low	,,
High frequency (Diathermic)	Extremely rapid alternating oscillations	1 to 2 mill per sec.	high	high	thermal and dynamic

Conduction through the body.

The animal body consists of a composite mass of tissues with varying electrical conductivity. In tissues, cells are surrounded by a solution of lymph and an electric current in order to reach the cells has to pass through the lymph fluid. The problem of electrical conduction in the tissues is homologous to the problem of conduction in an electrolytic solution, and a tissue may be regarded as a non-homogeneous solution. In applying an electric current to the body conduction and

subsequent effects will depend (1) on the form, strength and duration of the current. (2) area of the application.

The factor of skin resistance is of primary importance in electro-therapy. Generally speaking the skin can be considered as a partial conductor the conductivity of which is increased by mechanical, thermal or chemical stimulii. The horny layer of the skin offers most of the resistance. The consideration of the relative variations of the skin resistance toward the various currents explain difference in technique which is necessary in applying currents of low and high tension. Warming up and moistening help to decrease resistance and improve electrical conductivity. Practically no conduction occurs when metal or pad electrodes are placed on the dry skin, no matter how long a current is turned on. The moist gauze pad also serves to prevent corrosive effects liable to occur under bare metal when Galvanic current is applied.

Effects of Therapeutic currents.

The physiological action of electricity depends on the manifold physical changes outlined in Table I. Some of the physiological effects manifest themselves in the changes of irritability and conductivity of the neuromuscular system and in stimulation of the Vasomotor system. These are explainable by the chemical action of the Galvanic and low frequency currents. Other physiological effects manifest themselves in sedation of sensory nerves and sedation of motor nerves (relief of muscular spasm); they are explained by the production of heat by high frequency current. The chief physiological changes are: (1) Effects on the neuro muscular system. (2) Effects on Vasomotor system. (3) Effect on metabolism.

Effects on Neuro Muscular System.

Electrical currents serve as direct stimuli producing muscular contraction and influence the irritability and conductivity of the motor and sensory nerves.

If Galvanic current is suddenly started or interrupted ('made' or 'broken') over muscular parts or motor nerves there occurs a muscular contraction. The muscular contractions are not excited by direct electrical stimulation but are due to the concentration of H-ions (Acid reaction) at the negative pole at the make of the current and at the break of the current a similar concentration of hydroxyl ions takes place at the positive pole. Electrical stimulation by suitable currents not only exercises weak and paralysed muscles but also reacts by way of reflex through the spinal cord on the tone of muscles. It may influence brain centres through the transmission of the impression of motion or contraction and thus (in case of cerebral paralysis) favourably contributes towards restoration. A marked advantage of electrical muscle stimulation is that it can be used in the muscles in the state of full paralysis when there is no other form of exercise possible.

The high frequency current (diathermy) exerts definite sedative effects on irritable conditions of sensory nerves and this is based on the lessening of nerve sensibility by the penetrating heat effect. Diathermy is a useful measure for the sedation of hypertonic conditions in motor nerves.

Effect on Vasomotor System.

The flow of Galvanic and other low tension currents is accompanied by a marked stimulation of the vasomotor nerves and is followed by hyperæmia and better nutrition of the parts. It is worthy of note that electrical application for a relatively short period may be followed by vasomotor stimulation lasting several hours. Proper spacing of the treatment may keep up a stimulative effect and provide a better nutrition of the parts and an enhancement of the natural force of repair. Active hyperæmia follows applications of diathermy and the consequent temperature changes are more persistent than those produced by hot baths.

The physiological effects and the therapeutic uses of physio-therapy may be summarised as follows:

Current	*Primary physico chemical*	*Secondary physiological*	*Therapeutic uses.*
Galvanic	Mild thermal Ionisation	Vasomotor stimulation	Promotion of nutrition and relief of inflammatory changes in cases of acute and chronic inflam. conditions. (II) Arthritis, myositis sprains, neuritis etc. in chron. stages
Low frequency currents	Mild thermal, alternation of acid or alkaline reaction	Sensory and motor nerve stimulation	Exercise of weak and paralysed muscles
High frequency	Profound thermal	Increased circulation, sensory and motor nerve sedation, bactericidal	Relief of pain and spasm. promotion of nutrition and absorption. Inflammation of joints, bursae tendons delayed union of bones

Reference.

Dr. Richard Kovacs—(Electro therapy and Light therapy)
Veterinary Record 8—11—1952.

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An interesting Study on the Filariasis in Bovines

By

P. S. Krishnamurthi, B.V.SC.

(Department of Animal Husbandry)

When I was serving in Nagapattinam in Tanjore district, I came across three interesting cases of Filariasis in bovines. All the three animals that were treated presented sheathed larvae of Setaria cervi in blood, and from two animals the adult parasites were recovered from the peritoneal cavity on post-mortem. The parasites were confirmed as Setaria cervi in the Madras Veterinary College. It has been mentioned in literature that the parasite occurs in the peritoneal cavity of its host and is non-pathogenic. But the ailing animals I came across presented a definite clinical picture and I firmly believe it is due to only filaria, since there is no other possible etiology for the malady. Other environmental factors such as soil being deficient in minerals and malnutrition may be the pre-disposing causes. Tanjore being a delta area, naturally the soil is deficient in calcium, which may form an important factor in some of these diseases. Further in those areas cattle are not well-cared for, such predisposing factors induce a lowered resistance , the animals which may be normally harbouring these parasites suddenly develop systemic disturbances and evince clinical manifestations of the disease. The animals came for treatment from three villages in the coastal area near Nagapattinam. Two of the three attacks occurred in summer, when the activity of the flies are maximum. It is said, this worm is transmitted by the stable fly Stomoxys calcitrans.

Case No. 1. Bullock 378.
dated 30—5—1954.

Owner's name and address—Abdul Khader, cartman, Manjakollai.

History : The animal was reported to be going down in condition and having no appetite at all.

30/5 The bullock was young, grey in colour and having the typical appearance of a trotting animal. The temperature was normal. Routine examination of urine, dung and blood smears carried out ; gave salines consisting of the following.

Magnesii sulphas	2 oz.
Sodii chloridum	2 oz.
Pot. nitras	1 dr.
Aqua ad	10 oz.

Injected calcii gluconas 5% solution 100 cc intravenously. Blood smears were negative, the dung presented stray ova of Amphistomes and numerous ova of Strongyle species, and urine was normal.

31/5. Temperature was normal. Calcium injection was repeated. Orally electuary containing

Phenothiazine	½ oz.
P. gentian	½ oz.
Treacle Qs	was given

1/6. The animal was standing as mute as a mule. So as to stimulate it into activity, injected Liquor Strychnine hydrochloride 2 cc subcutaneously and orally gave an electuary containing

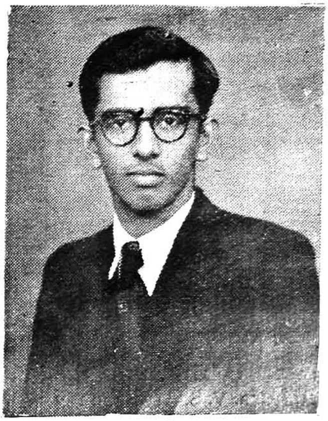
Ammonium carbonas	½ oz.
Pulvis nux vomica	1 oz.
Treacle Qs	

2/6. The mucous membrane was icteric. Gave 50 cc of 25% glucose solution intravenously. Orally saline as on 30/5 was repeated.

3/6. The animal evinced distinct symtoms of icterus. The whole body was yellowish. Repeated salines orally and atropine sulphas gr. ¼ hypodermically for relaxation of sphinctre of biliary duct for free flow of bile into the intestines.

Miss Roopmala

M. S. GOPAL



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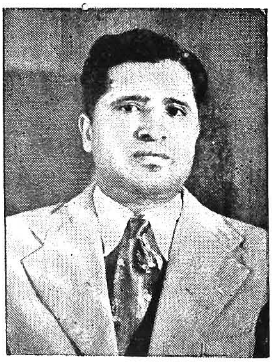

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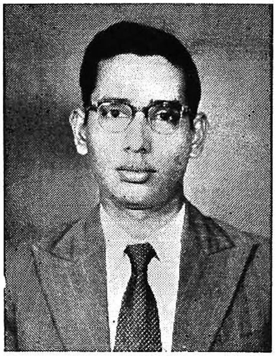

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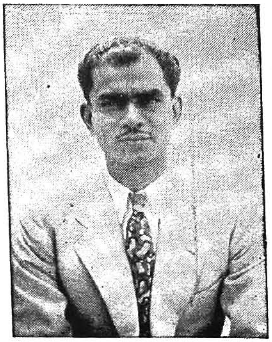

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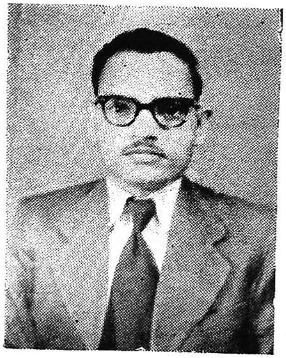

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4/6. Blood smears were examined. On casual examination of wet film 3 or 4 microfilariae were detected showing the intensity of infection. Immediately Antimonii et. Potassium tartate gr. v along with calcii gluconas ½ dr. in 20 cc of Aqua distillata was injected intravenously. It is customary to give this drug in Tanjore district either with saline or calcium as otherwise the animals do not tolerate the drug well. Orally electuary containing the following was given.

Ferri sulph. exic 1 dr.
Pulvic gentian ½ oz.
,, nux vomica 1 dr.
Treacle Qs.

The animal died during the night at 11 p.m. On post-mortem the next day the adult parasites Setaria cervi were recovered from the peritoneal cavity. The animal was found to have died of haemolytic jaundice.

Lesson: Whenever you come across a case which is difficult to diagnose, a casual examination of a wet film of blood—provided you are having a microscope, is always beneficial. The above animal could have been saved if an early diagnosis of the condition was made. Further wet film facilitates immediate diagnosis of the conditions like Filariasis, Trypanosomiasis etc., as otherwise it will take some time for staining a dry smear. Sometimes we do not get the microfilariae at all in the dry smear.

Case No. 2. He-buffalo 455.
dated 9—6—1954.
Owner's name and address: Sri R. Ganapathy, Mirasdar, Anthanapettai.

History: The animal came to the hospital walking from its place about 2 miles distance from the hospital. The animal was going round and round on its own axis for the past 24 hours.

9/6. The animal was circling round on its own axis in clockwise direction. There was vision in both eyes. Temperature 101°F. Blood film revealed sheathed larvae of Setaria cervi. Injected antimoni et Potassium tartras gr. v in 20 cc Aqua distillata with calcii gluconas ½ dr. intravenously. Found that the animal was satisfactorily tolerating the drug. In the evening the microfilariae were found to have disappeared from the peripheral blood. The animal was still circling. Injected Magnesii sulphas 1 dr. in 20 cc Aqua distillata subcutaneously.

10/6. The animal stopped circling. Repeated tartar emetic injection. The animal was moving here and there with in-co-ordination in gait. In the evening injected glucose 25% solution 50 cc intravenously and vitamin B complex 4 cc intramuscularly.

11/6. The animal died, probably because the disease was already in advanced stage when the animal was brought to the hospital. Autopsy revealed Setaria cervi in the peritoneal cavity. Portions of the brain and spinal cord were submitted to the Principal, Veterinary College, for finding out the necessary lesions if any, presuming that the animal died of cerebro-spina-nematodiasis. Histopathological examinal tion revealed no abnormality.

Case No. 3. Heifer—1408.
dated 7—10—1954.
Name of owner and address: Michael, Ryot, Therkupoyyur.

History: The animal was reported to have difficulty in swallowing.

7/10. T. 104°F. The animal was found to have no abnormality, in the pharynx and oesophagus. Injected Sodii salicylas 1 dr. in 20 cc Aqua distillata intravenously.

8/10. T. 102°F. Respiration and pulse rate were normal. Examination of wet film of blood revealed sheathed larvae of Setaria cervi. The animal was having a distressed look, not at all feeding and standing quiet, as morose as a camel. Injected Antimoni et Potasii tartras gr. iii with Calcii gluconas ½ dr. in 20 cc Aqua distillata intravenously.

9/10. T. 100.6°F. The animal drank water in the morning. Orally the following Haustus was given.

Sodii sulphas	
Mag. sulphas	a a 2 oz
Spts. Amm. Aromaticus.	
,, Aetheris nitrosi	a a 1 oz
Tr. nux vomica	1 dr
Aqua ad	12 oz

10/10. The animal was quite normal and vigorously ruminating. Repeated tartar emetic injection.

11/10. The animal was discharged as cured.

The owner of the animal was persistent that the animal had some obstruction in the throat region. I was able to convince him with great difficulty by actually showing him the parasites in blood, that the animal was harbouring parasites in its system and that the suspension of feeding and other activities were only due to the blood parasites. After the treatment was over, the owner took away the animal extremely gratified. I also felt happy, because a scientific diagnosis of the condition was made quite early, proper treatment carried out and a cure effected. It is only on such occasions, I experienced a culmination of such a feeling and not on proceeding to attend private cases. Supposing an early diagnosis of the condition was not made as in case No. 1, a similar course and sequel might have resulted here also.

Concluding, I have to state that during a stay of about six months in Nagapattinam, I came across three cases of Filariasis from three different villages. As the disease is transmitted by biting flies, naturally it is kept alive by carriers. I think it will be very interesting if a preliminary survey about the incidence of the disease is made, in those endemic areas. That means, a systematic examination of blood smears of cattle of selected villages, and working out the percentage of carriers have to be carried out, as we can no longer consider the parasite as non-pathogenic. At least the disease flares up, and clinical manifestations are seen when the resistance of the host is lowered due to other causes. The disease has to be eradicated by controlling the breeding of flies by proper disposal of manure, and also clearing off bushes where cattle are grazing nearby. Carriers of the disease should be detected and sterilised off infection.

Punctuality is the soul of business.

Patience is the plaster for all sores

Honour and shame from no condition rise.
Act well your part; there all the honour lies.

—Pope.

Radio-Active Isotopes

By

G. Jagan Mohan, Final Year, B.V.SC.

What are radio-active isotopes? How are they produced? What is the use of these? The word isotope comes from two Greek words—"Iso" means same, and "topes" means place. The word was coined to describe certain atoms which although different in weight still occupy the same place in the periodic table of elements—since they are atoms of the same element—such as Hydrogen, Phosphorus, Carbon and Iodine, *e.g.*—they behave alike chemically.

Isotopes therefore are like "twins" that look and act alike, but which are different in weight. The radio-active isotopes or radio isotopes as they are called are atoms that give out radiation and disintegrate to become other kinds of atoms. It is this radiation that makes the isotopes valuable to an extent still to be realised especially in veterinary field.

Production: Some radio isotopes occur naturally as in uranium the power of which has been recorded long before 1900. As these isotopes are very costly for our daily use, we had to produce isotopes artificially which was less costly. Thus man-made isotopes came into usage. These man-made isotopes are considered as the most important discovery since the invention of the microscope.

Its usage in Veterinary Field: It aids the veterinarians in the eternal struggle to eliminate some of the unknown causes of diseases in his patients. Atomic energy offers new tools and new weapons particularly in valuable breeding and stud animals where cost is not at all a criterion. Scientists throughout the world are now using radio-isotopes to explore the remaining mysteries of the living body. We hope by careful usage we could also utilise atomic energy for diagnosing tumours etc. in animals especially those situated in the brain of cattle, œsophagus of dogs and the like.

Its usage in Meat Preservation: Meat has a self-storage life of about three days. When packed and irradiated it is said to have a self-storage life of four to twenty-one days. The taste is said to be slightly affected. Scientists however hope to solve this problem. Pork infected with Trichinella spiralis needs 12,000 Roentage to kill the parasites. After this irradiation meat can be safely passed for human consumption. It has also been found that potatoes and food grains irradiated with about 2,000 Roentage can last for two years without being spoiled. Really it is a remarkable feat!

X-ray apparatus: Recent works have led scientists to produce a portable X-ray unit with the utilisation of the atomic rays It is a tiny apparatus which could be used in small animal practise especially for picturing broken limbs in cats and dogs. It weighs only 10 lbs. and so it could be moved from place to place with ease. Radiothulium 170 is used in the apparatus. It has a radio-active strength to the tune of 10,000 volts. There is a small battery which operates the shutter to allow X-rays to come out as desired. By this apparatus X-ray pictures could be taken without any waste of time. It is less costly and needs no special technicians to operate it. This apparatus when produced on a commercial basis is said to cost only Rs 750.

Teletherapy: Like ultra-violet rays, radio-active rays could be used for treatment. The usage of radio-active rays is called Teletherapy. The radiation source is kept away from the patient, and is well protected from causing

any harmful effect on the patient. Sometimes the isotopes are kept close to the patient for treatment. This is called Brachy-theraphy. Teletherapy may be tried in the following diseased conditions of animals:

1. Opacity of cornea.
2. Any tumour situated deep in the body, the exact position which is not known.

Finally isotopes are used as tracers. In the study of animal physiology, isotopes are mixed with the feed and fed to the animals. Its path could be traced inside the animal by a special apparatus called Garger-counter. On this principle it has been possible to find out the percentage of deposition of calcium in egg shells by feeding the bird with calcium mixed with isotopes and analysing the egg shell for isotope content. Again radio-active phosphorus could be used as a tracer to measure the rate at which phosphorus in teeth and bones is replaced. The application of isotopes not only refers to phosphorus but also to a variety of materials absorbed into the body as food or otherwise and incorporated in the tissues.

They are, therefore employed in the study of absorption and elimination of newly formed drugs and thus contribute materially to the advancement of Pharmacology. Another point which is of much importance to Geneticists is that Radiations could be tried by careful handling to bring mutations in the living body. If we succeed in this attempt, it may be that this new energy may prove a shortcut to a better breeding of animals.

Thus for bettering our animal wealth and for the study and treatment of certain diseases of our patients, atomic radiation opens new vistas.

Acknowledgment: This article has been prepared from the information kindly furnished by Mr. HOLDREN of New Chicago, Director of "Atom for Peace Exhibition" and I take this opportunity to express my sincere thanks to him.

"Look not sorrowfully into the past. It comes not back again wisely improve the present. It is thine; Go forth to meet the shadowy future without fear and with a manly heart."

—H. W. LONGFELLOW.

In character, in manners, in style, in all things the supreme excellence is simplicity.

—H W. LONGFELLOW.

Some facts and figures about our Livestock and Dairying

By

P. O. George, Final Year B.V.Sc.

Much has been said about developing the dairy industry of our country. Indeed, it is one of the most important problems we have to solve, and adequate attention is paid to this problem in the second Five-Year-Plan. If the targets aimed at are attained in time, we can anticipate definite improvements in the existing conditions, in the near future. At this juncture, it would be worthwhile to examine the present state of affairs regarding our dairy industry, so that we can grasp the magnitude of this problem and realise how much improvement is required to reach the level of western countries where dairy industry is well developed.

Import and Export of Milk and Milk Products: Sri A. P. Jain, Union Minister for Agriculture in an address delivered at the National Dairy Research Institute (Karnal) said—" Dairying like Agriculture, is one of the basic industries of India. Milk and milk products contribute no less than Rs. 620 crores to our national divident.". As far as the income is concerned, this is a major industry, but it is a fact that this industry is still in an undeveloped stage in our country. Though we produce milk and milk products worth Rs. 620 crores, yet we are importing quite a large amount of milk and milk products from other countries. Our export is meagre when compared to the quantity of import. Table I shows the quantity and cost of milk and milk products we have imported and exported during the last two years.

TABLE I

Import and Export of Dairy Produce in India.

	1953—1954		1954—1955	
Article.	Quantity in Cwts.	Rupees.	Quantity in Cwts.	Rupees
Import—				
1. Milk: Condensed and preserved:				
(i) Evaporated or condensed.				
(a) Whole and cream.	98,816	1,06,47,189	1,04,533	99,37,596
(b) Skimmed.	22,318	13,16,237	11,734	7,05,111
(ii) Dried powder.				
(a) Whole. ..	24,275	39,20,313	24,019	40,57,420
(b) Skimmed. ..	3,68,857	3,00,27,633	5,44,124	3,85,97,168
Total of milk condensed etc.	5,15,266	4,59,11,372	6,84,410	5,33,47,295
2. Butter.	14,119	43,11,394	12,225	38,03,576
3. Cheese.	10,428	22,92,225	9,284	19,44,069
4. Ghee. ..	30	6,891	104	23,180
5. Milk food for infants. ..	90,621	2,01,35,102	52,921	1,24,48,918
Export—				
Ghee. ..	21	5,706	28	9,076

Milk consumption : Many people in our country, though we are mostly vegetarians, do not consume milk. Sixteen percent of the families are not consuming milk or milk products at all. The average daily *per capita* consumption of milk in India is calculated to be only 6–7 fluid ounces, whereas in New Zealand and Australia the daily *per capita* consumption of milk is 55 ounces and 45 ounces respectively. In India, the average milk consumption is more in the northern parts than that of the southern parts. In Madras the *per capita* consumption of milk is only 3·6 ounces per day. Of the total production of milk, 36·2% is consumed as fluid milk, 43·3% as ghee, 9·1% as Dahi, 6·3% as butter, 4·1% as Khoa and the remaining as other products like cream, ice cream etc.

Livestock population : India is the country which has the largest number of cattle in the world. We have 198 million cattle, 47 million goats and 39 million sheep. As far as our milk production is concerned, 54% is from the cows, 43% from the buffaloes and 1.6% from the goats. When Egypt has 25 cattle per 100 acres and Holland has 38 cattle per 100 acres, there are about 70 cattle per 100 acres in our country. The following table shows the number of livestock per 100 acres in few states of India.

TABLE II

Distribution of Livestock in some Provinces and Average size of holdings.

Province.		Total livestock per 100 acres of cultivated land.	Average size of holdings in acres.
Bengal	...	104	2.8
U. P.	...	44	3.4
Assam	...	87	3.6
Bihar	...	69	3.7
Madras	...	49	4.8
Punjab	...	37	9.0
Bombay	...	24	12.4
Central Provinces	...	39	13.2

Milk production : India produces 481.55 million maunds of milk a year which works out to about 1½ million maunds a day. United States produce 120 billion pounds of milk annually according to U. S. Department of Agriculture statistics. Our country stands first in possessing the largest number of cattle; at the same time we have to realise that our cattle are probably the last in milk production.

We have developed few breeds of cattle, the more important of them are the Sahiwal, Tharparkar, Sindhi, Gir, Kankrej. These breeds are not in plenty. Most of our cattle do not belong to any particular breed, but are non-descriptive. While comparing with the British breeds, even our best breeds do not give a satisfactory picture, regarding milk production, early maturity and lactation period. Regarding butter fat percentage, our cattle excel the European cattle.

The following table gives the average yield, and butter fat percent of some breeds of Britain.

TABLE III

Average yield recorded in herds in England and Wales—1952-53

Dairy breeds.	No. of herds.	Live weight in lbs.	Milk yield in lbs.	Butter fat percentage
Ayreshire ...	4,210	1,000	7,901	3.86
British Fresian ...	7,458	1,250	8,946	3.51
Guernsey ...	2,199	950	7,072	4.59
Jersey ...	1,822	800	6,668	5.08
Dual purpose breeds				
Dairy short horn...	4,269	1,250	7,243	3.59
Red poll ...	575	1,100	7,177	3.64
Dexter ...	29	650	4,571	4.24

In countries where dairying is well developed, the cow is considered as 'milking-machine'. No doubt they do deserve it. How are the cows in India? Our best breeds like Sahiwal, Sindhi and Gir may give an average of 4000 lbs. of milk per lactation. But we should keep in mind that majority of our cows do not belong to any of these recognised breeds. On an average, Indian cow, with an average lactation period of 210 days, gives only about 3 lbs. of milk a day, and a she-buffalo with an average lactation period of 300 days gives about 6 lbs. of milk a day. Dr. Punjab Rao Deshmukh points out, "Not less than 10% of our cattle are unproductive or unserviceable, over half of which are moving carcasses."

Malnutrition: This is another serious problem that we have to face. It is mainly due to the poverty of the cattle owner, lack of grazing area, and concentrates for live-stock feed.

TABLE IV

Article	Requirement per annum in million tons.	Available per annum in million tons
Green fodder ...	381.0	161.1
Dry fodder ...	227.5	135.2
Concentrates ...	77.5	7.5

This data shows that we stand far behind as regards the production of livestock feed is concerned. Mr. Grahame Williamson points out, "A cultivator from his three acre holding of rice land might count a return of about 9 maunds of rice per acre and 22 maunds of straw and at the most 27 seers of bran. His pair of 500 lbs. bullocks need at least 30 lbs. of fodder per day or 137 maunds per annum." Hence it is obvious that the cultivator with his three acre land -as illustrated in Table II is unable to meet the requirement of his pair of 500 lbs. bullocks nor is he in a position to purchase for his bullocks owing to poverty.

Cattle owners: We have few well organised dairy farms in our country. 95% of the milch cattle are in rural areas and 90% of our people live in rural areas. But the economic status of our villagers, does not permit them to spend much for their cattle since they themselves live in misery. Sri A.P. Jain says, "The one and a half million maunds of milk produced per day in India, is obtained from about 67 million cows and buffaloes, maintained in early 40 million small and fragmented holdings, scattered throughout the length and breadth of the country. These holdings are owned by some of the worlds' poorest peasants". This statement is clearly understood when comparing the *per capita* income of an Indian with the *per capita* income in other countries.

TABLE V

Country.		National Income in crores of rupees.	*Per Capita* income in rupees.
India	...	10,600	284
Ceylon	...	441	540
Australia	...	4,127	4,900
United Kingdom	...	19,625	3,858
U.S.A.	...	1,44,423	9,016
Canada	...	8,407	5,688
Philippines	...	1,654	7,847

Educationally also, India is an under-developed country. Hence they are unable to understand and appreciate the modern, scientific trends in growing their cattle. They stick on to the old methods and will not agree for a change over for adopting scientific methods for want of understanding.

Want of Trained Personnel: Development of cattle in our country is entrusted with the veterinarians who are well trained in Animal husbandry as well. Indian cattle suffer from a variety of diseases which may end in sweeping away a good number of their population or make them useless and unproductive temporarily or permanently. Many cattle do not get the veterinary aid, if at all the owner may wish so, owing to the lack of veterinary hospitals. "At present, it is estimated that there are about 3,000 veterinary graduates in service in India. In addition there are about 3,000 Stockmen also". This is not at all sufficient to meet the requirement. We require few more thousands of veterinary graduates for the successful implementation of N.E.S. schemes and Key village centres. In India, I doubt whether we have one veterinarian for every forty thousand heads of cattle. The following data will illustrate how the position is in other countries.

TABLE VI

Country.		*Animal units per veterinarian.	Total number of veterinarians.
Canada	...	9,464	1,350
U.S.A.	...	7,235	16,000
Denmark	...	3,885	1,261
Britain	...	3,933	4,129
Holland	...	4,331	932
Sweden	...	5,229	713

*1 animal unit is 1 bovine or 1 equine or 3 sheep or goats or pigs or 100 poultry.

We have a vast field for improvement. We have the largest number of cattle population, but they have to be improved and they are being improved. We can expect a better future for our dairy industry, but remember "Rome is not built in a day."

References :

Our India—Minoo Masani.

Indian Dairyman, January 1955. July 1955, June 1954.

Veterinary Bulletin. Vol. 24.

Proceedings of the Animal Husbandry Wing of I.C A.R I.

Inaugural Address of Dr. Punjab Rao Deshmukh at the Joint Session of 12th All India and 11th Madras State Veterinary Conference.

Our Cattle problem—C. Krishna Rao, M.V.C. Annual Vol. X.

Circular letters from the Minister of Agriculture.

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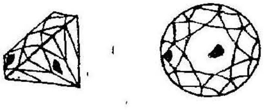

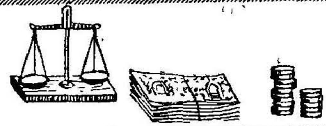

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The Meat supply of India

• By

D. Ganesh, Final Year, b.v.sc.

This has been• classified for convenience under the following headings:

1. The food animals
2. Transport
3. Ante-mortem inspection
4. Slaughter houses
5. Methods of slaughter
6. Collection of blood
7. Post-mortem inspection
8. Slaughter house practice.

The food animals: The animals which supply flesh for consumption by the peoples of India consists almost entirely of cattle, sheep, goats and pigs. Horses whose flesh comprises quite a considerable proportion of the meat eaten by countries such as Denmark, Holland and France, do not appear to play any part in the meat supply of India, while rabbits, hares, venison and wild boar also furnish only a small proportion of the total meat consumed.

India possesses some 208 million heads of cattle, *i.e.* one third of the world's population and about 10 per cent of these animals are regarded as unserviceable or unproductive. There are thirty varieties of bulls and cows and eight varieties of buffaloes and generally speaking the cattle may be classified into those of a draught type, a milk type and a combination of the two, the dual-purpose animal. In no part of the country does it appear that cattle are bred and fed exclusively for the purpose of yielding meat and for this reason the majority of the bovine animals slaughtered for food are of unsatisfactory confirmation and their bodily condition is such that in many parts of the world, they would come within the category of emaciated animals. This bodily condition is directly related to the shortage of available food and as better feeding would probably raise the milk production, by some 30 per cent. It is reasonable to suppose that meat from cattle exclusively of the beef type could be produced, provided there was satisfactory demand. But there are factors which mitigate against any development of a purely fat stock industry, firstly there is a fairly general prejudice against the slaughter of animals of the bovine species; secondly the economic condition of the cattle owners is such that their animals must serve a dual purpose of supplying means of traction and also furnishing a supply of milk. Without their cattle and the useful manure these animals supply for fuel purposes, the villagers would starve and for this reason many of the states in India have restricted cattle slaughter by the introduction of legislation which prescribes that only old animals shall be admissible for human food. The result of this is that most of the beef sold in the market in India is tough, unpalatable and of relatively poor calorific value. An exception to this fairly general statement must be made in the case of the meat from the buffalo for most of these animals furnish really excellent and well nourished carcases and it is therefore surprising that this flesh commands such a poor price compared with that of the flesh of sheep and goats. It is probable that the calorific value of much of the buffalo meat sold would be within the region of 1800 calories per lb whereas the calorific value of most of the goat flesh and some of the mutton would probably not be greater than 900 calories per lb. Thus the buffalo would appear to be an animal of the triple purpose type namely as a worker in the paddy fields, as a yielder of rich nutritious milk and as an animal producing meat with a high food value.

The sheep and goat particularly the latter are eaten to an extent far greater than either of ox or pig, for there is religious prejudice against them. Except for the hill

mutton in the Simla District the animals one sees, were generally of a poor bodily condition. The buffalo and the pig are the animals which appear to fatten best on such food as is available to them in India. One could not fail to be impressed by the well nourished carcasses of pork one sees in many of the slaughter houses in India.

Transport: The lairage of animals awaiting slaughter leaves much to be desired in many of the towns visited. Not only should animals be provided with a shed to protect them from the direct rays of the sun (and for this reason the lairage shed should be situated on the north of the slaughter house compound and face south) but it is advisable that animals prior to slaughter receive ample supplies of drinking water as this ensures that the animal bleeds better when slaughtered, that the carcase is easier to dress and that the flesh has a brighter appearance.

Antemortem Inspection: Great importance is attached to this procedure in the slaughter houses in India and one would wish that a similar degree of vigilance were extended to the subsequent post-mortem examination. In some towns on enquiry it was found that animals which were rejected during an antemortem inspection were presented again shortly afterwards in the hope that they might escape the scrutiny of the inspector and accepted for the slaughter. This practice could be obviated by marking the foot of the rejected animal, which if presented again for examination, could be identified and the reason for the previous rejection readily ascertained. Animals in Indian slaughter houses are rejected for slaughter for various reasons, including disease, pregnancy and emaciation.

Slaughter Houses: It is essential that every slaughter house in India should be wire proofed against the entry of birds. The second essential is that carcasses should be dressed 'off the ground' and this entails the provision of hooks for the dressing of sheep, goats and pigs and mechanical hoisting devices for the dressing of cattle. The inflation of sheep and goat carcasses by the mouth should be forbidden and inflation should only be permitted if a pump is used.

Though most authorities have provided buildings in which cattle, sheep and goats are slaughtered, it is frequently the practice to permit the slaughter of pigs on private premises, usually some distance from the main slaughter house. In some cases pigs are slaughtered indiscriminately and the carcasses not inspected, though the meat finds its way into the markets. The slaughter of pigs should not be permitted except in a municipal slaughter house, and religious prejudices could be met by slaughtering them in a separate building at one end of the slaughter house compound and providing a separate entrance.

Methods of Slaughter: In India practically all the animals are slaughtered by cutting the neck vessels without the animal previously being rendered unconscious. This practice is open to criticism on humanitarian grounds though there can be no such objection to the 'jatka' method of slaughter of sheep and goats in as much as this entails instant decapitation. No religious custom can be advanced to justify the inhumane means by which nearly all pigs are slaughtered and consideration should be given by every local authority to the desirability of rendering these animals unconscious before the throat is cut. By far the most satisfactory way of carrying this out is to render the pig unconscious by electrical means, the advantages of this method being that it is cheap, produces complete unconsciousness and enables the maximum amount of blood to be recovered from the carcasses when the neck vessels are severed. Where electrical current is not available the animal may be satisfactorily stunned by a pistal of the captive bold type.

Collection of Blood: The blood collected from slaughtered animals has a definite value as a fertiliser and as a feeding stuff for animals. In the smaller abattoirs the method of collection and disposal is by necessity somewhat primitive but in the

abattoirs of large towns the amount of blood available are great and its collection and drying are a definite economic proposition. In order to collect the blood of cattle satisfactorily the best procedure is to institute a bleeding rail in the slaughter house, this being situated at one corner of the building and from which all animals may be suspended and bled into a suitable container. In this way the blood is collected at one central point for further treatment, while the slaughter house floor is kept much clean than where the animals are bled indiscriminately at numerous locations on the slaughter house floor. Similarly there should be no difficulty in bleeding sheep and goats at one central point the carcase being subsequently carried to a hook on which dressing can be completed. A simple method for preparing blood meal on a small scale has been described by Miller in "Indian Farming" and consists of introducing the blood into boiling water in an iron pan, the mixture being stirred continuously for half-an-hour, than the cooked blood squeezed in a home-made press and dried in the sun.

Post-mortem Inspection : An accurate post-mortem is the only means of detecting the important bacterial and parasitic diseases which affect animals and some of which are transmissible to man. Bovine T. B. does not appear to be the problem that it is in many European countries, but there is no doubt that more cases would be detected if the internal organs were examined in the manner described above. The same remarks must apply to the question of T. B. in pigs and it is possible that the cases that do occur in pigs are attributable to infection with the bovine type of the tubercle bacillus and not to the avian type, which is responsible for nealy all the cases of T. B. in pigs in the United States and for a proportion of cases in pigs in the United Kingdom.

The unhygienic habit among the population of indiscriminate defecation of fields and waste land must obviously be a factor in the etiology of infection in cattle, with *cysticercus bovis* and pigs with *cysticercus cellulosae*. These affections do undoubtedly exist in India and it should be a routine procedure in examination of bovine carcases to incise the masseter muscles of the jaw and the muscle of the heart. Similarly every pig carcase should be examined for *Cysticercus cellulosae* by incision of the diaphragm heart and tongue and there is much to recommend the practice of splitting all pig carcases so that the exposed muscle surface may be examined for the presence of cysts.

Hydatid disease is a serious and widespread affection in all the food animals and many cases were encountered during one's visits to the various slaughter houses. One would stress the importance of incising the lung tissue of slaughtered animals in search for hydatid cysts, as these occur just as commonly in the lungs. Feeding of lung and liver of slaughtered animals to dogs is the main cause for high incidence of the disease So it is absolutely essential that every slaughter house should be provided with an incinerator and every large abattoir with a by-product plant in which parts or organs can be destroyed. Once a regular routine inspection is made in abattoirs accurate records should be kept of all diseases found and the condemnation made.

Slaughter House Practice : The following practices should be observed.

(*a*) Splitting the sternum of sheep to permit inspection of thoracic walls.

(*b*) Detaching the thoracic organs so that the heart and lungs suspended from the carcass, this again facilitating inspection and,

(*c*) Removing the rectum from the dressed carcass.

Generally speaking, the facilities for cleaning the stomach and intestines at the slaughter house and inadequate and there should be plentiful supply of running water and washing receptacles where this can be done. In the larger abattoirs it would be advisable for this cleansing to be under-

taken by municipal employees and in this way the presence of women and other casual workers in and around the slaughter house would be avoided. These authorities who forbid the entry of all unauthorised persons into their slaughter house are unanimous as to the desirability of a regulation of this nature, not only on aesthetic grounds but in order to prevent unwarranted persons picking up meat scraps in the slaughter house, which constitutes a definite public health danger.

Satisfactory hygienic methods of transporting carcasses and offals from abattoir to meat market can only be secured if this is undertaken by the municipality who must provide some-linked trucks for the purpose. Quarters of beef and carcasses of other animals should preferably be hung on hooks fitted to the inside of the truck.

Acknowledgment : My grateful thanks to Dr. F. D. Wilsan, Lecturer in Meat Inspection for his valuable guidance and suggestion in the preparation of this article.

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Protein Requirements in Poultry Feed

By

G. VASUDEVA RAO, III, B.V.SC.

What are Proteins ?

The proteins are of outstanding importance in livestock feeding, because they are essential for life. In addition to carbon, hydrogen and oxygen, the proteins in plants and animals contain nitrogen. Most proteins also contain sulphur and a few contain phosphorus or iron. The proteins are exceedingly complex compounds, each molecule probably containing many thousands of atoms. Each molecule of protein is composed of a considerable number of different nitrogenous compounds called aminoacids. The aminoacids may therefore be called the " building stones " from which the proteins are made. The complex nature of the proteins is evident from the fact that there have been identified at least 23 aminoacids which may enter into their composition. Just as the letters of the alphabet may be combined into innumerable words, so the possibility for the combination of the aminoacids into different proteins is almost limitless. In animals, not only the protoplasms but also the cell walls are chiefly protein. Therefore the protein forms by far the greater part of the muscles, the internal organs, cartilage and connective tissue, and also such outer tissues as skin, hair, wool, feathers, nails and horns. Protein is one of the chief constituents of the nervous system and it even forms an important part of the bony skeleton, giving it tenacity and elasticity.

Percentages of Protein needed in Poultry ration :

The protein requirements of poultry are generally stated in terms of the percentages of total protein (not digestable protein) which are needed in rations for good results when the protein is of satisfactory quality. The National Research Council of United States of America has recommended the following percentages of protein (total protein) in rations for chickens. For chicks upto eight weeks of age 20% ; for chicks from eight to eighteen weeks of age 16%, and for laying hens 15%.

Quality of Protein :

In poultry rations it is fully as important to have protein of good quality as it is to have sufficient amount of protein. Rations in which the protein comes entirely from grain and grain by-products produce poor results, because of poor quality of protein, even if there are ample supplies of minerals and vitamins. Therefore the milk and milk by-products, meat scraps or tankage and fish meal are very efficient in correcting the deficiencies in the proteins of the grains and the grain by-products. However, it is generally cheaper and more economical to use smaller amounts of these animal protein supplements than would be required to balance a ration fully and to supply part of the needed protein from protein supplements of plant origin.

Part of the high value for poultry of the protein supplements of animal origin is due to their richness in calcium and phosphorus and also in their content of vitamins. Therefore, when plant protein supplements replace a considerable part of the animal protein supplements in poultry rations, care must be taken to add whatever mineral and vitamin supplements may be needed.

The value and use for Poultry of the many different Protein Supplements:

Alfalfa hay, alfalfa meal and alfalfa leaf meal for poultry.

These alfalfa products are by far the most commonly used Vitamin A supplements for poultry not on pasture. Because of its high vitamin and lower fibre content, alfalfa leaf meal is commonly preferred to alfalfa meal for poultry ration especially for chicks and broilers. Alfalfa meal or leaf meal can be used to replace part of the

wheat bran or wheat middlings commonly used in poultry rations. Including alfalfa meal or leaf meal in the ration for hens tends to improve the hatchability of the eggs. Alfalfa leaf meal has been superior to dried young cereal grass for this purpose.

Soybean Oil meal and Soybeans.

Among common feeds, soybean oil meal is the best substitute for protein supplements of animal origin in poultry feeding. Soybeans should be used for poultry only when better protein supplements are not readily available. Numerous investigations have shown that in using soybean oil meal as the chief protein supplement, it is especially important to correct the deficiencies of calcium and riboflavin and phosphorus. If the ration is thus properly supplemented soybean oil meal gives excellent results when used to replace at least one half of the animal protein needed to balance rations for chicks, growing pullets, or laying hens. Too large a proportion of soybean oil meal in the starting mash for chicks may cause trouble from " Pasting up " in which the faeces stick to the down feathers. Peanut oil meal (ground-nut oil meal) can be used in the same manner as the soybean oil meal for poultry.

Cotton-seed meal.

In some districts of our State where cotton-seed meal is the cheapest protein rich feed it can replace part of the meat scraps or other protein supplements of animal origin that would be needed to balance the ration. However, it should not be used as the chief protein supplement, because the quality of the protein is not high and also because of possible detrimental effects. It is therefore best not to use more than 5% of cotton-seed meal in the entire ration for laying hens and preferably even less if the eggs are to be stored. Rations for chicks may contain slightly higher percentages.

Linseed meal.

Linseed meal has not generally given good results in poultry feeding, even when combined with protein supplements such as fish-meal and milk by-products. As little as 5% of linseed meal has depressed the growth of chicks and 10% of the linseed meal in ration caused the death of all the Turkey Poults with which it was fed. It has recently been reported that better results can be secured with linseed meal if it is soaked for 10 to 24 hours before being fed.

Skim Milk and Buttermilk.

Dairy by-products are especially valuable for poultry because they not only furnish excellent protein but also their high content of riboflavin is of particular value for poultry. Even when a ration containing no milk product is given, it has excellent protein and plenty of riboflavin, and the results are generally improved when a milk product is added to it. This improvement may be partly due to the beneficial effect produced by the milk sugar in helping to prevent the development of undesirable bacteria in the digestive tract. It may also be due to other vitamins furnished by milk. The milk by-products cause chicks to grow faster and more uniformly. They also tend to increase egg production, improve health, decrease mortality and improve hatchability of eggs. When skim milk or buttermilk is available, poultry may be allowed to drink as much as they wish. The amount for hundred hens will usually be from 12 to 14 quarts a day. An excellent combination is to use about one half of the usual amount of meat scrap or fish meal, with the milk in addition.

Meat Scraps, Meat and Bone Scraps ; and tankage.

Meat scraps are the most widely used protein supplement of animal origin in poultry feeding and are a common ingredient of poultry mashes. They are well liked by poultry and supply protein that corrects the deficiencies in the proteins of cereal grains and their by-products. The quality of protein in meat scraps containing 55% or more of protein is apt to be better than that in meat and bone scraps, which are lower in protein content. Sometimes blood meal is used in poultry feeds, but it is unpalatable to poultry and is inferior to meat scraps in value.

Fish Meal.

Good fish meal is an excellent protein supplement for poultry, the quality of protein being somewhat superior to that in meat scraps. Since most fish meals are not so palatable as meat scraps, only 5 to 10% should be included in the ration. Numerous experiments have been conducted to determine the minimum proportion of animal protein supplements that are needed in poultry rations for optimum results. The minimum percentages of animal protein supplements recommended by the National Research Council of America are as follows:

In chick starting mashes ...	3% to 4%
In chick growing mashes and in hen laying mashes (to be fed with grain) ...	3.5% to 4.5 %
In hen breeding mashes (to be fed with grain) ...	7% to 9%

It should be borne in mind that these are the minimum percentages of animal protein supplement recommended for optimum results. When there is a plentiful supply of feeds of animal origin and prices are not unduly high, somewhat larger proportions of these feeds are desirable in poultry rations.

Amino acid requirements of chicks.

The National Research Council of America has stated in tentative form the following requirements of aminoacids in rations for chicks upto eight weeks of age:

Arginine ..	1%
Glycine ..	1%
Lysine ..	0·9%
Tryptophane..	0·25%
Methionene ..	0·9% (Methionene 0·5% plus cystine 0.4%)

Aminoacid content of certain Feeds that are Commonly used in Poultry Rations.

	Arginine	Glycine	Lysine	Trypto phane	Methionene	Cystine
	%	%	%	%	%	%
Alfalfa leaf meal	1·05	...	0·96	0·38	0·46	0·36
Corn grain	0·39	0.40	0·22	0·07	0·27	0·19
Cotton seed meal	3·41	2·30	1·42	0·47	0·78	0·95
Fish meal	3·74	4·40	4·83	0·78	1·90	0·65
Oats grain	0·69	...	0·36	0·13	0·23	0·18
Linseed meal	2·95	...	1·14	0·55	0·73	0·61
Meat scraps	3·90	2·20	2·80	0·38	0·94	0·66
Rice polished	0·58	0·82	0·26	0·10	0·27	0·11
Rice bran	0·82	...	0·52	...	...	...
Rice polishings	0·75	...	0·46	...	...	...
Skim milk dried	1·33	0·20	2·60	0·46	1·00	0·42
Soybean oil meal	3·00	7.60	2·61	0·53	0·79	0.66
Wheat grain	0·55	0·92	0·36	0·14	0·17	0·23
Wheat bran	0·90	...	0·56	0·24	0·19	0·27

References:

1. Modern Poultry Farming. Louis M. Hurd.
2. Linton's Animal Nutrition & Dietetics. By J. T. Abrams.
3. Feed's and Feeding —Morrison.

*Parasitology Lessons in Verse

1. Acanthocephala

Said the Spiny-headed Worm, as he stretched his mesoderm,
"I'm a nothing, just a nothing, non-descript.
I'm without a proper skin, devoid of endoderm within,
And my dwelling is this duodenal crypt.

"It is always pleasant weather, till the worm-men get together
To discuss my taxonomic status quo;
Then the fur begins to fly, for they don't see eye-to-eye,
And I'm called an enigmatic so-and-so!

"Though I'm not hermaphroditic, still many a helminth critic
Has dared to put me with the tapeworm tribe.
It may be my rostral hooks or my gutless cestoid looks,
To which no scientist would dare subscribe.

"I'm getting in a rut, vegetating in this gut—
It's environment that makes me act this way!
But I've lost the only gene for a gut that might have been—
I'm descended from a tapeworm – so they say!

"If these taxonomic gents had a modicum of sense,
They'd seek the answer where it ought to be;
And I'd straightway from the shoulder, with a spirit bold and bolder
Say: "The tapeworms are descended all from Me!"

[*By* A. WEIR BELL in *Turtox News*, 1949, 27(3),92].

2. The Onchosphere

The Onchosphere or Hexacanth was not designed for frolic,
His part may be described perhaps as coldly diabolic :
He is born amidst some gruesome things, but this should count for virtue,
That steadily, 'gainst fearful odds, he plies his task—to hurt you!

He is very small, a mere pin's head, beset with six small hooklets,
Is whirled about by wind and rain thro puddles, fields and brooklets;
But if a pig should swallow him as many porkers do,
He's made a start with no mistake: he's on the road to you!

Again I say, don't blame the brat—he hasn't any head!
It isn't any fault of his—he wasn't painted red;
But once inside, he burrows through, and gropes his way about,
Then swells and sprouts a head at last, though this is inside out!

He is now a cysticercus in the muscles of the pig,
With just a sporting chance of getting out to grow up big;
If you will consent to eat your pork half-raw or undone,
His troubles will be over, and a Tapeworm will have won;
He will cast his anchors out, and on your best digested food
Will thrive, and bud an endless chain to raise a countless brood.

(from Garstang's *Larval Forms and other verses*)

*Collected by M. Anantaraman, Research Officer (Helm.).

Phylum Studiata

(Commonly called " Bookworm ")

By

R. Ganesh, II Year, B.V.SC.

After many years of laborious and intensive research, it has now been possible to establish correctly the phylum, class and order of certain species of worms that are commonly known as "Bookworm".

The following are the results of our research:

Phylum:—Studiata.

Class: —Mug pot.

Order—Cram and vomit.

Habit and Habitat: Bookworms are chiefly found in schools and colleges all over the world. They are chiefly nocturnal in habit as they prefer nights for their nefarious activity of eating books. During the day they inhabit the classroom or the library. In the classroom they invariably prefer the front bench.

Morphological characters: The body of these worms are thin and bony. They are dull to look at. The face of the worm is always pale with hollow eyes which are red during the examination season. Most of the worms have some eye defect or other and hence they wear glasses of the thick variety.

The females of the species can be easily distinguished by the bend in the middle of the body. They are usually more dull and leaner, than the male worms. The female of the species are larger in number than the males.

Locomotion: They move about very slowly with inactive steps. They always prefer to stay at one place and eat books.

Digestion: These worms swallow large quantities of printed matter, written class-notes and sometimes even text-books and record books. If library books are readily available, they would not mind swallowing them also. But they have a particular aversion to magazines, newspapers and novels.

The bookworm has a very peculiar kind of digestion. Alimentary canal is completely absent as food is readily absorbable in printed or written form. The swallowed food is stored in the brain by a process called "remembering". During examination season this process of "remembering" does not take place. Then, the food is stored in the mouth and it is immediately vomitted on the answer paper.

Excretory system: Excretory system is absent. In some cases the unabsorbed food materials simply evaporates and this process is known as "forgetting".

Nervous system: The nervous system is very well developed. The brain works mainly for the purpose of feeding on books and absorbing them and not for any other purpose.

Special features: The worms do not mix with other worms or enter into conversation. They do not sleep much. And during examination season they feed through out the nights. They have no response to wit, humour or joy. They seldom smile. They have a special prejudice against theatres, clubs, meetings and playgrounds.

Pathogenesis: These worms feed only on books and avoid other nutritional food materials. Hence there is complete degeneration of the brain cells. Since they are sleepless their health deteriorates day-by-day. Eye sight becomes poor.

Treatment: These worms must be given some sleeping pills in small doses every day.

The dose may be slightly increased during examination seasons.

Economic importance: These worms spoil the aim of education by adopting wrong methods such as "mugging" and not playing any games etc. They are very dangerous to society. If we allow them to spread in the world, there will be a great loss to free thinking and originality.

There is a common uproar among the dull headed worms of the colleges that these "bookworms" raise the standard of the subjects in the examinations. The Government must do something against this.

Prophylaxis: By some force these worms must be pulled to the playgrounds, clubs, theatres and meetings. Or interest in these may be induced by offering free tickets to cinemas etc. The Government can offer a prize of Rs. 50 to any one who captures these worms and brings them to the playground, cinema, etc. These worms may be punished by fines if they are seen eating books after 10 p.m.

Conclusion: We hope that the scientists will come forward and do further research on this and make it useful to society.

We should not fail to mention that our Veterinary college is not devoid of these "bookworms".

We tender our thanks to some of the "bookworms" in the hostel for their kindness in providing us with the material for our research by making themselves available to us for our observation and study.

We thank all the students of the Veterinary Colleges in India

for their kind co-operation and patronage given

to us this academic year.

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TRIPLICANE, MADRAS-5

Quotations Recollected during the First Year

COMPILED BY

CHANDRAN DANIEL, B.A.,—I YEAR, B. V. SC.

First Day :

" I wandered lonely as a cloud
That floats on high o'er vales and hills "

—*Daffodils.*

Ducking by seniors :

" When the world laughs at me I laugh at the world. So we are even ."

—*Bean Tibb's at home.*

First week class :

" I ought to have done more."

—*Too late.*

Regular classes begin—Physiology :

' Ah ! but a man's reach should exceed his grasp'.

—*Andrea Del Sarto.*

Chemistry :

' Say not, the struggle not availeth,
The labour and the wounds are vain '.

—*Say not, the struggle not availeth.*

Anatomy :

' I am part of all that I have met ;
Yet all the experience is an arch where thro '
Gleams the untravelled world, whose margin fades
For ever and for ever when I move '.

—*Ulysses.*

Biology :

' I look up and am dazzled, look down, and am darkened, look round and am puzzled '.

—*G. B. Shaw's Caesar & Cleopatra.*

N.B.—Maths. student in Intermediate class

Shoeing :

" Stepp'd on so far that, should I wade no more,
Returning were as tedious as go o'er.

—*Macbeth.*

Handling :

' On a cheek
The life can burn in blood, even while the heart may break '.

—*Adonais.*

Exams. begin.

' Me miserable ! which way shall I fly ?
Infinite wrath and infinite despair.'

—*Paradise lost.*

Before the results :

' But O heart ! heart ! heart !
O the bleeding drops of red !

—*O Captain, my Captain.*

After favourable results :

' There was a time when meadow, grove and stream,
The earth, and every common sight,
To me did seem
Apparelled in celestial light '.

—*Immortality Ode.*

When God afflicts thee, think he hews a rugged store, which must be shaped or else aside as useless thrown.

Goodness consists not in the outward things we do, but in the inward things we are.
—CHOPIN.

When a man aims at nothing, he seldoms misses thee target.

Do you know That.....

COLLECTED BY

R. GANESH, II YEAR, B. V. SC.

1. The white ant is neither an ant nor is it white.
   (It belongs to the order Orthoplira and is brown in colour).
2. The pulmonary vein is not a vein.
   (It is an artery).
3. Turkish baths are neither turkish nor are they baths.
   (They are hot air rooms of Roman oiigin).
4. A pine apple is neither an apple nor is it a pine.
   (It is a berry).
5. Peanuts are not nuts.
   (They are beans).
6. The Egyptian Sphinx is not a sphinx.
   (It is the statue of the God Mormactris).
7. The silver fish is not a fish.
   (It is an insect).
8. The sealing wax contains no wax.
   (It is made of shellac, rennice turpentine and cinnabar).
9. Westminster Abbey is not an Abbey.
   (It is a Collegiate Church of St. Peter's).
10. Banana oil is not made from bananas.
    (It is a by-product of petroleum).
11. The horned toad is not a toad.
    (It is a lizard).
12. The deer-forest is not a forest and does not necessarily contain deer.
    (It is a fenced enclosure for wild game).
13. Tin cans are not made of tin.
    (They are rolled iron thinly coated with tin).
14. An alligator pear is neither an alligator nor a pear.
    (It is a herry).
15. Moving pictures do not move.
    (They are series of still pictures).

Collections of sayings or "Quotable Quotes"

COLLECTED BY

J. STANISLAUS ANTONY, FINAL YEAR, B.V.SC.

1. Happiness is a perfume you cannot pour on others, without getting a few drops on yourself.

2. **Chemical warfare** : The eternal struggle between blondes and brunettes.

3. Alone is a person who deprives you of solitude without providing you with company.

4. The only difference between the saint and the sinner is that, every saint has a past and every sinner a future.

5. Duty is what one expects from others.

6. The greatest undeveloped territory in the world is under your hat.

7. Reward of the ideal man—infinite expectations.

8. **Politeness** : The most acceptable form of hypocrisy.

9. **Edible** : Good to eat and wholesome to digest as a worm to a toad, toad to a snake, snake to a pig, pig to a man, and man to a worm.

10. The soul is born old but grows young—that is the comedy of life.

11. To get into the best society nowadays one has either to feed people, amuse people, or shock people. To be in it is merely a bore—but to be out of it is simply a tragedy.

12. Never try to understand women, women are pictures, men are problems.

13. No one is exempt from talking nonsense, the misfortune is to do it solemnly.

14. Women can keep a secret just as well as men, but it takes more of them to do it.

15. **Budget** : Mathematical convictions of your suspicions.

16. **Feminine wile** : Keeping a man at arm's length by a hand's breadth.

17. Hollywood is a city lined with palms—all of them itching.

Endowments

We hear with pleasure the following prizes have been offered :—

Dairy Science.

SRI M. KULLAMMA NAICKER
DONOR.

1. Sri M. Kullamma Naicker of Neikarapatti Estate Prize—*by* Sri Janakamma Kullamma Naicker, Zamindar of Neikarapatti, Periakalayamputhur.

Rs. 2,000

Genetics.

2. Rao Bahadur Dr. R. Swaminatha Ayyar Memorial Medal—*by* The Madras Race Club.

Rs, 3,000

Best All Round Student.

3. Sir Dorabji Tata Prize—*by* Sir Dorabji Tata Trust.

Rs. 3,000

Surgery.

4. Dr. Swaminatha Ayyar Memorial Prize—*by* N. Krishnamurthi—Retired. Superintending Engineer Electricity Department, Madras.

Rs. 2,000

Medicine.

5. Dr. A. Srinivasan's Prize—*by* Dr. A. Sreenivasan, M.R.C.P. (LOND.) M.R.C.S. (ENG.) M.L.C.

22-A, Cathedral Road, Madras-6.

Rs 2,000

We sincerely thank the donors for their generosity.

In Memorium

PROFESSOR G. RAMANUJACHARI

Born: 22nd October '13 — Died: 10th December '55

We deeply regret to record the passing away of Sri G. Ramanujachari, our beloved and learned Professor of Parasitology after a short period of illness. Cruel death laid its hand on our young and energetic professor in a most unexpected manner at his early age of forty-two.

Born on 22—10—1913 Sri Ramanujachari had his high school career in the Hindu High School, Triplicane. Studying his Inter in the Christian College, Madras and B.Sc. in the Presidency, he entered the portals of our *Alma mater* in 1935. As the University Course was introduced only in the next year, he continued his studies in the first year itself along with the first batch of students for the B V. Sc., Degree Course. After his graduation in Veterinary Science, he served in the districts of North and South Arcots for over a period of three years before being drafted to the college early in 1943. From that period onwards he was on the staff of the Parasitology department. Government fixed him up as a worthy candidate for the post of the Lecturer in Parasitology and sent him for training during 1948—'49 at the Indian Veterinary Research Institute—Mukteshwar. In that premier Institute, Sri Ramanujachari earned a name for his deep knowledge in the subject and for his keenness to learn newer techniques. In 1950, he succeeded Sri S. V. Mudaliar, the then Principal and Lecturer in Parasitology on his retirement, as the Lecturer in Parasitology. He was designated as Professor of Parasitology in 1954.

After assuming charge of that coveted post, Sri Ramanujachari set his heart and soul in enriching the great tradition of the Parasitology Department of our College. Besides turning out as a master in the art of teaching by virtue of his lucid and expressive talk, he got himself immersed in the varied pieces of research undertaken in that department. His work covered wide fields in that vast branch of science from studies on the protozoon parasites such as Trypanosoma and Theileria and arachnids as the ornate ticks which are rarities in our state to the helminths of elephants, pigs and cats. The publication of 20 papers in the course of about five years covering varied aspects of Veterinary Parasitology is an eloquent testimony to his intensive research activities. For helping the students in the assimilation of parasitology, he took pains to prepare a 'Practical Guide to Veterinary Parasitology' which was made available to the students through the co-operative society. He was in constant correspondence with such stalwarts in the subject of parasitology as Dr. Leiper and Dr. Cameron in connection with his researches. The enrichment of the Helminthology Museum of the Parasitology Department by the addition of over 80 newer collections was due to the untiring efforts taken by the late professor. His initiative and planning has made the introduction of the Post-Graduate course in Veterinary Parasitology—the only one of its kind in the whole of India, a *fact accompli*.

The presence of the entire college at his funeral speaks volumes about the immense popularity of the late professor. His loss is irreparable both to the college and to the science of Parasitology. Within a short span of life he has acquired a lasting place in the gallery of the few selected galaxies of Indian Veterinary Parasitologists. To his young widow and 3 small daughters we convey our sorrow and heartfelt condolences.

May his Soul rest in peace.

The Late
Dr. RAMANUJACHARI, B.Sc., G.M.V.C., B.V.Sc.,
Professor in Parasitology

Madras Veterinary College Association

Annual Report 1955—56

Office-bearers:

President : Dr. Bertie A. D'Souza, G.M.V.C., B.V.SC.
Vice-President : Dr. K. P. Chandrasekharan Nair, G.M.V.C., B.V.SC.
Student Chairman : J. Stanislaus Antony.
Secretary : S. Thandava Krishna.
Asst. Secretary : G. Venugopal.
Treasurer : A. T. Venugopalan.
Editor : D. W. Ezekiel.
Sub-Editor : A. Bashyam.

Class Representatives :

C. M. Narasimhulu Naidu.	*I Year.*
K. J. John.	,,
Ham Peng.	*II Year.*
A. Ramakrishnan.	,,
P. Padmanabha Reddy.	*III Year.*
S. A. Joseph.	,,
Bhagawandas.	*IV Year.*
B. Ramachandra Rao.	,,

Lady Representative : G. Subhashini. *III Year.*

Advisers : Sri M. Anantaraman, M. A., M.SC., F.Z.S.
Dr. D. Mariappa, G.M.V.C.
C. K. Velayudhan Nair, G.M.V.C.

The Madras Veterinary College Association presents with great pleasure its 20th Annual Report on its activities during the year 1955–56. This year has been quite an eventful and impressive period in the history of our Association. We have the good record of having successfully conducted a number of functions and enjoying the memorable visits of some of the leading personalities of our profession.

There has been an increase in the number of members of the Association consequent to the increased admissions this year.

It is the first time for the students of our College to venture to do livestock relief work in the cyclone and flood affected areas of the South. We did a strenuous job of inoculation work for more than two weeks, inspite of the adverse circumstances prevalent there. Our students have contributed voluntary labour in the construction of an open air theatre in our College premises which was declared open by Sri Kamaraj, Chief Minister of Madras, on the College Day.

Our students have taken part in the Quiz Programme conducted by the All India Radio, Madras. We were also competing in the Inter-collegiate Oratorical contests conducted by the University of Madras and other City College.

Mr. P. Ramakrishna and Mr. Purushothaman have taken part in the Inter-collegiate Music competitions conducted by the Madras Medical, G.C.I.M. and Law Colleges. Mr P. Ramakrishna won the first prize again in the competition conducted by Law College.

Our College Association is affiliated to the Madras City College Council and the World University Service. Under the auspices of the World University Service all our students and staff were mass 'X' Rayed. We have also contributed Rs. 270 to the Prime Minister's Relief Fund this year.

The Social Service League has been doing its duty by distributing milk powder, etc. to the poor boys in our vicinity. It has become a common practice for us to sell flags and collect money in hoondies for the Red Cross, S.P.C.A. Services and other similar organisations doing social service.

Inaugural Address . The Madras Veterinary College Association was inaugurated on 3rd August 1955 by Dr. Ananta Narayan Ayyer, B. A., M.B.B.S., M. SC., F. R. SC., Director of the Upgraded Department of Anatomy, Stanley Medical College, Madras. During his address he exhorted the Veteri-

nary students embarking on an eventful mission of service to the speechless, to keep as our watchword the oft quoted saying of Mahatma Gandhi "To wipe every tear from every eye". Dr. Bertie A. D'Souza, Principal, presided.

Independence Day : The National Flag was hoisted at 7-15 a.m. All the students and staff stood in horse shoe fashion and saluted to the flag. Later at 9 a.m. Sri T. Chengalvarayan ex-Mayor of Madras, addressed the students recalling the sufferings and humilations our people were put into during the fight for freedom. Dr. Bertie A. D'Souza, Principal, presided.

Reception to New the Graduates : The Reception to the New Graduates was held in the College premises—a refreshing contrast to the receptions held in the previous years. Sri N. E. S. Raghavachari, I.C.S., Director, Community Projects, Government of Madras, addressed the new graduates. After the speech, the graduates were entertained with dramas and dances, etc.

Nutrition Professor's visit : Dr. Yudkin John Joseph, M.A, Ph.D., B.SC., M.R.C.P., F.R.I.C., Professor of Nutrition, University of London spoke on "Nutrient Requirements, their determination and use" on 16th September 1955. Dr. Mahadevan, Professor of Nutrition, presided.

F.A.O. Day : The 10th anniversary of the Food and Agricultural Organisation of the United Nations was celebrated in our College on 17th October 1955. Sri V. R. Rajagopalan, Director of Animal Husbandry, addressed the gathering. The Student Chairman presided over the meeting.

Bombay Milk Commissioner's visit : Mr. Kharody, Milk Commissioner, Bombay, was invited to our college on 20th October 1955. He gave a clear description of the way Aarey Milk Colony is organised and how it is able to serve the people of Bombay. Dr. Bertie A. D'Souza, Principal, presided.

Condolence Meeting : An extraordinary General Body Meeting was held on 12th December 1955 to condole the sudden death of Sri G. Ramanujachari, Professor of Parasitology. Dr. Bertie A. D'Souza, Sri Anantaraman, Mr. A. Mohan Rao and J. S. Antony spoke about the late Professor.

Human Rights Day : A meeting was held on 17th December in connection with the 7th anniversary of the Universal Declaration of Human Rights. Dr. K. P. Chandrasekharan Nair, Vice-President presided.

Republic Day : Sri N. Gopala Menon, Speaker, Madras Legislative Assembly, spoke on the achievements of our Indian Union after gaining independence. Dr. Bertie A. D'Souza, Principal, presided. Earlier students saluted to the National Flag.

All India Veterinary Students' Association Conference : The second meeting of the All India Veterinary Students' Association was held at our College on 19th February 1956. Delegates from various Veterinary colleges were invited. Rao Sahib Sri T. Vinayaka Mudaliar, addressed the members and Dr. Bertie A. D'Souza, welcomed the delegates.

In spite of our intense desire to screen films of professional interest, we could not do so due to the paucity of new films. We hope the Association will be able to hire new films in future and make screening films a regular feature.

It is with great pleasure we record our sincere thanks to our President, Dr. Bertie A. D'Souza for his valuable guidance. He was very keenly interested in the activities of the Association.

The Vice-President Dr. K. P. Chandrasekharan Nair was guiding us at every step and thanks for his kind and sympathetic attitude towards us.

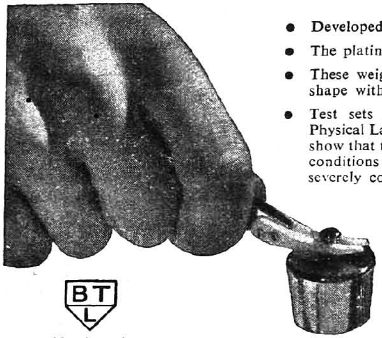
We thank the advisers Sri M. Anantaraman, Dr. D. Mariappa and Dr. C.K. Velayudhan Nair for their valuable guidance.

Finally our thanks are due to the members of the Association including the staff without whose splendid co-operation we could not have accomplished any thing.

S. THANDAVA KRISHNA,
Secretary.

G. VENUGOPAL,
Asst. Secretary.

B.T.L. ANALYTICAL TIN / NICKEL ALLOY PLATED WEIGHTS



- Developed with the co-operation of the Tin Research Institute.
- The plating has no undesirable magnetic properties and gives a smooth finish.
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The Madras Veterinary College Association

Report

A report on the livestock relief work in the Cyclone and flood affected areas of South India.

In the first week of December 1955, the districts of Tanjore and Ramnad were the worst affected by the cyclone and floods. Consequently there was a heavy loss to the cattle population. Even though special teams of Veterinary Surgeons were deputed to the cyclone and flood affected districts for taking up special measures for prevention of cattle epidemics, it was strongly felt that more personnel should be available for doing vaccination against Black-Quarter and Haemorrhagic Septicaemia. In this connection, Dr. Bertie A. D'Souza, Principal, Madras Veterinary College, requested the students to rise up to the occasion and do their best for the welfare of the animal kingdom in the devastated areas.

Nearly 80 students volunteered themselves to do relief work in the cyclone and flood affected areas. The eighty student volunteers were divided into batches for working in the districts indicated below.

Tanjore	..	30
Ramnad	..	30
Madurai	..	10
Tiruchy	..	10

These four batches were seen off at Madras Egmore by the Director of Animal Husbandry, Deputy Director of Animal Husbandry, Principal, Madras Veterinary College and other members of the staff. All these batches of student volunteers were again sub-divided and were attached to the Veterinary hospitals and dispensaries to carry on the operations.

Each student volunteer was provided with a kit containing a syringe, spare barrels, needles and vaccine bottles. The work usually begun early in the morning and they used to work indefinitely depending upon the availability of cattle for vaccinations. It was the usual practice to intimate the villagers a day or two before so that cattle could be made available in large numbers for vaccination. Besides, vaccination was done even at shandies where cattle were collected in large numbers. On an average each student did not less than 200 vaccinations a day

Till 6th January 1956 we did livestock relief work in the four districts covering a large area. We had to come back on 7th to Madras as the college was reopened by that time. Though we could not go to our houses during the holidays, we are glad that the vacation was spent in an useful way by rendering service to the animal population in the south.

We are highly indebted to our Principal, Dr. Bertie A. D'Souza for he has given us the opportunity to get ourselves acquainted with the rural conditions and the steps taken during outbreaks of diseases.

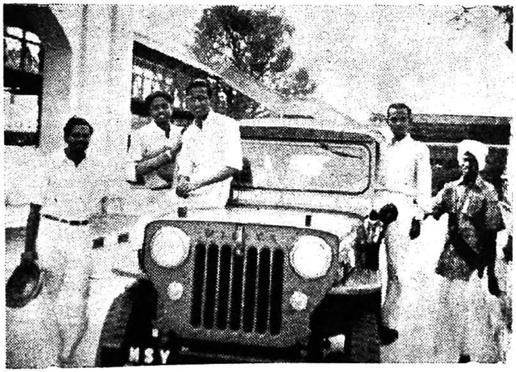
Our sincere thanks to the Director of Animal Husbandry, the Deputy Director of Animal Husbandry, Special Officers and the Veterinary Surgeons who gave us every help and looked after our comforts during our stay in the cyclone and flood affected areas.

S. THANDAVA KRISHNA,

Leader, Student Volunteers & Secretary, Madras Veterinary College Association.

Our Humble Contribution to the Cyclone Relief Work.

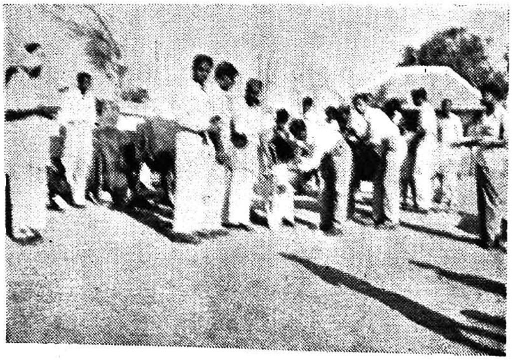
Egmore Station, Hearty send off.



Off for work.

Exaltation, agonies and love, 'And Man's unconquerable mind

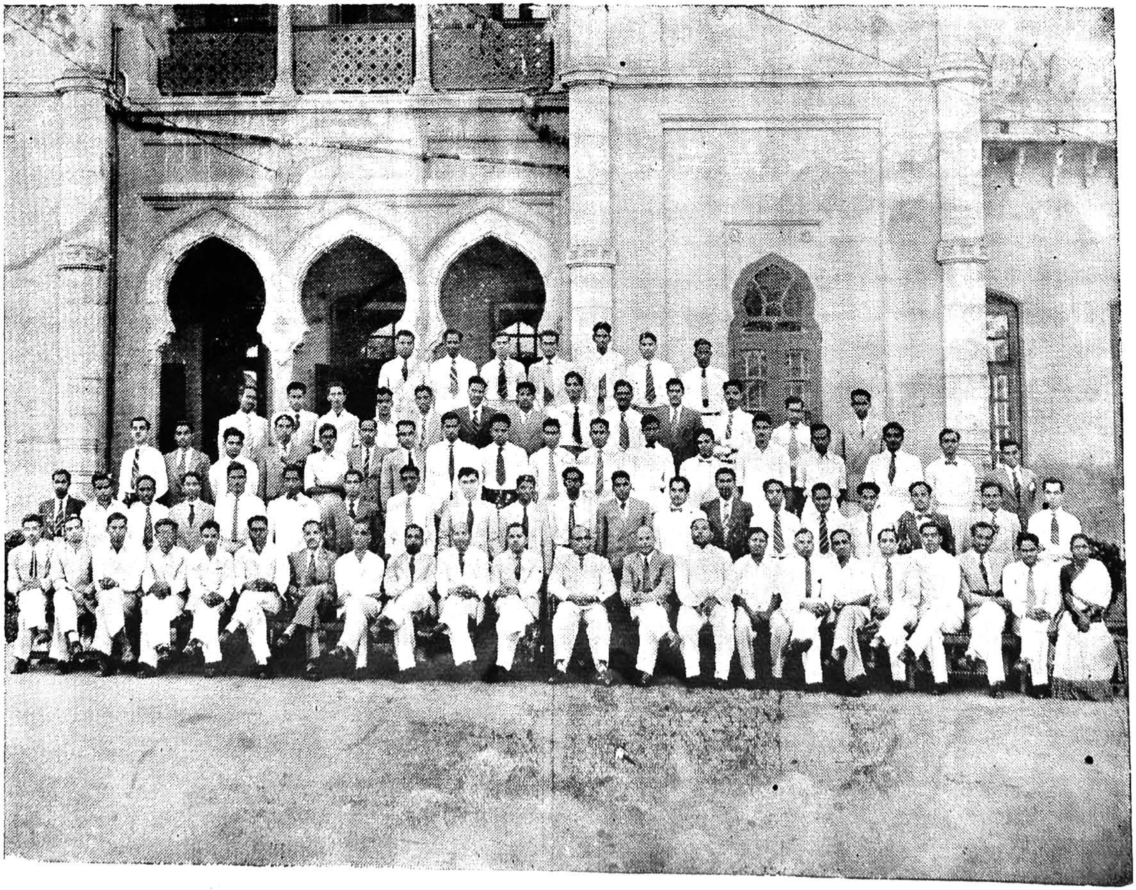
Volunteers at work.



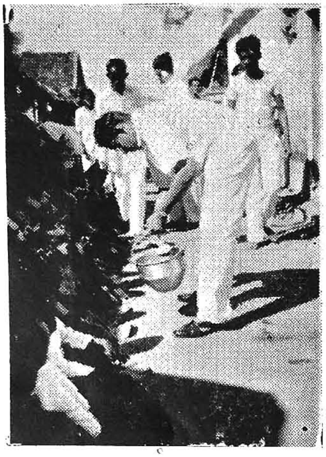
Volunteers at the devastated area.

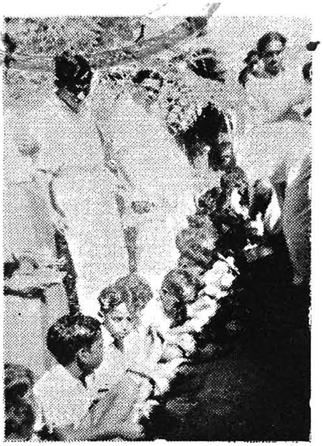
A stitch in time saves nine

FINAL YEAR—B. V. Sc. 1955-1956

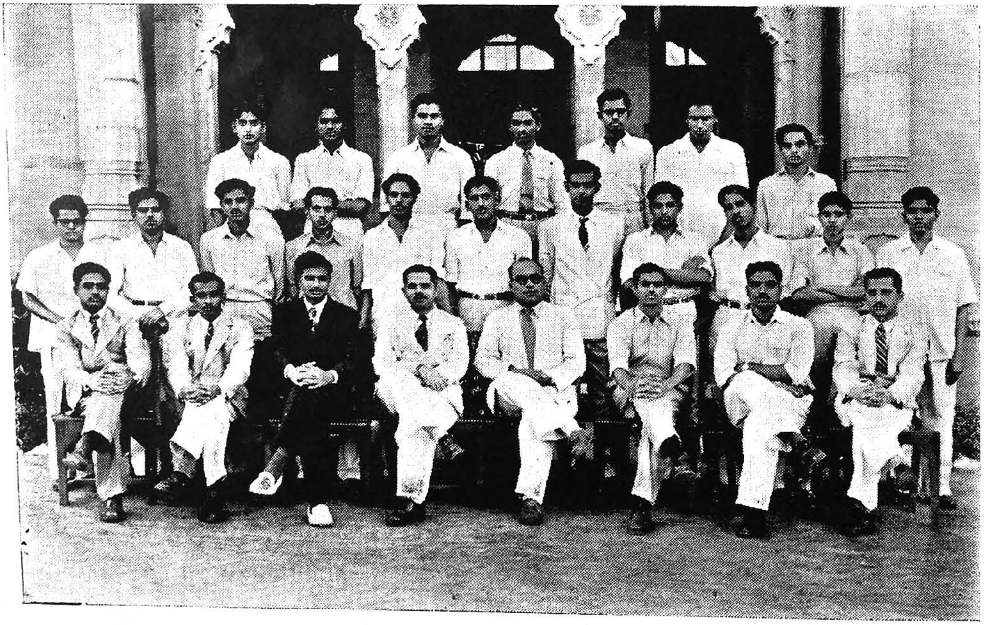


Social Service League.





Give me, O Give me, My Daily Bread.



Members who took part in the city-wide Beggar Survey with the President and Vice-President of the Association.

Social Service League

Report

I have great pleasure in presenting a report on the activities of the "Madras Veterinary College Students Social Service League" for the academic year 1955-56.

The highlight of this year's activities was the humble contribution of our service to the cyclone affected areas of Tamilnad. A batch of eighty students went to Madura, Ramnad, Trichy and Tanjore districts and administered medical aid to the cattle. Our main work was mass inoculation of animals, thus preventing them from any epidemic that may arise. We attended on the poor homeless people and gave them clothing and money. At the same time we did not forget Orissa which was also affected with floods and raised funds in aid of their flood-relief work.

Milk and nutritious food are being distributed to the children attending the night school at the Naval Hospital Road. This has helped to a considerable extent in increasing the number of children attending the school regularly. During the city wide survey of beggars conducted by the Madras School of Social work, our members did their part considerably well. Useful work as sales of Red Cross flags and S.P.C.A. flags were done by our social workers.

Thus our league marches on slowly but steadily looking with confidence on the future with faith and hope.

G. VENUGOPAL,
Secretary.

The Madras Student's Adult Education Council

Report

The year's activities began early in September with the opening of the Adult School in Swathanthra Nagar by the Council. Two or three students from every college handle classes every week end. Milk is distributed to the children of the locality every week. Miss Vijayalakshmi, M.A., M. litt., addressed the men and the women of the area on 1st November, 1955 and stressed the importance of education. From November, classes are being conducted in Rotary Nagar, Lloyds Road. A statistical survey of literacy in the area was conducted so that suitable measures could be taken to eradicate illiteracy.

A short film show on Adult education was shown, under the auspices of the Council, at the Little Theatre, U.S.I.S. Mount Road, Students from six colleges attended. Mr. Heath of the U.S.I.S. addressed the gathering and Mrs. Rajam Ramaswamy of the Guild of Service presided.

A short certificate course on 'Adult Literacy' was conducted on Saturdays during January, 1956, with the view to meet the demand for trained personnel to handle classes at the Adult School. Adult Psychology, School Organizations and Methods of teachings were some of the subjects taken for the course. 120 persons, from various colleges attend the course.

The Council intends holding a Seminar on Adult Education early in February, 1956 at the end of which the certificates will be distributed to those who attended the course.

In spite of many obstacles, financial and otherwise, the Council has been forging ahead in its humble attempt to eradicate illiteracy.

KINGSLEY RAJ,
President.

The Madras State Social Service League Annual Conference—Kozhikode

The seventh annual state conference was held at Kozhikode from 7th to 9th October 1955. The conference was inaugurated by Sri B. Gopala Reddi, Chief Minister of Andhra, under the Chairmanship of Sri C. Subramanian, Finance Minister, Madras, at the Kozhikode Victoria Jubilee Town-hall, Shri Sri Prakasa presided.

As many as fifteen students from the various City College Social Service Leagues attended the conference. Renowned social workers from different parts of the state participated in the conference. Subjects discussed in the conference were interesting and lively throughout.

THE TOPICS FOR SECTIONAL MEETING WERE:—

(*i*) Welfare Projects in Rural areas.

Chairman: Sri C. Subramanian.
Secretary: Sri K. V. Sridharan, (Director, School of Social Work, Madras).
Speakers: Sri N.E.S.Raghavachari, Director, Community Projects. Sri. P K. Nambiar, District Collector, Coimbatore.
Subject: "Community Projects and Social Welfare" This section was inaugurated by Shri Sri Prakasa.

(*ii*) Current Problems in Social Welfare.

Chairman: Sri K. Madhava Menon, M.P.
Secretary: Mrs. V.T. Lakshmi.
Subjects: Beggar Problem, Legal Aid for the Poor.
Speakers: Mr. Kurup, Mr. John Valvi, Secretary, I.C.S.W., T.C. State.

(*iii*) 'Welfare of Tribal and Backward Classes'

Chairman: Sri B. Gopala Reddi.
Secretary: Sri Raghaviah of Nellore and Mr. Rao of Calicut.

There were three sub-committees and the pannel as follows:

1. National Child Care Code.
   Chairman: Mrs. Kuttiammalu Amma.
   Secretray: Mrs. V.T. Lakshmi.
2. Model Department of Social Welfare.
   Chairman: Dr. U. Krishna Rao.
   Secretary: Dr. Jayalakshmi A. Rao.
3. Emergency Relief.
   Chairman: Miss Evelyn Hersey.
   Secretary: Mr. M. A. Parthasarathy.

Panel discussion on Mental Hygiene and Social Welfare.

Chairman: Dr. Dhairyam.

Student delegates from Madras, Ooty, Vellore and Local colleges gathered in an informal way. Mr. Ignatious Absolam, Principal, Government Arts College, Ooty was among us. Our attempts to urge the conference to have a separate pannel for students discussion and to allow half fee delegate, was not successful. Concluding session was presided by Sri B. Gopala Reddi and resolutions were passed.

A very interesting exhibition was organised and it included exhibits from U.S.I.S. and Government Departments. The exhibition was opened by H. H. Zamorin of Calicut.

Nice excursion was arranged to Ferroke and pleasant row in the back waters. Rev. Mother Gabriel was kind enough to take the student delegates to "Providence College" situated at the picturesque 'Florican Hills'. Students from Madras can never forget Rev. Fr. Vergotione for his courtesy and kindness.

The short stay in Kozhikode will be green in our memory as the ever green palms of Kerala.

S. SHIVASUBRAMANIAM.

Report of the Madras Veterinary College Athletic Association

The inaugural meeting of the Athletic Association was held on 15-7-1955. The Principal, Dr. Bertie A. D'Souza, presided over the meeting. The Captains of the various games were selected at this meeting as follows. Vice-Captains were nominated by the Sports Secretary.

	Captain.	*Vice-Captain.*
1	Cricket—Samuel Kamalesan	K. Radhakrishna Reddy
2	Hockey—J. S. Anthony	A. B. Ambaprasad
3	Football—R. S. Karkhani	V. V. Ramaraju
4	Basket-ball—John Joseph	Varadarajan
5	Volleyball—H. Ramananda Shetty	P. A. Balu
6	Tennis—Sivasubramanyam	S. Radhakrishna
7	Boxing—Austin Anantharaj	Md. Gousallah

K. Krishnankutty of III Year was unanimously elected as the General Captain.

Inter-Collegiate competitions:

This year we entered the league competitions in Cricket, Football, Hockey, Basket-ball and Volleyball. Our boys put up a good show and acquitted themselves creditably.

Knock-out Tournaments:

Our teams entered in the Madras University Knock-out Tournaments in Hockey and Football. Even though we did not win our teams put up a good show. Further as the Inter-Collegiate league competitions begin very early in the first term there was not much opportunity to give our teams necessary training. Still our teams did creditably well.

University selection:

It is noteworthy that out of our boys who went for selection in various games, V. P. Sridharan of II Year was selected for the University Football Team. Likewise also M. Thimmappa Rai of IV Year was selected in Athletics for Javelin Throw. Md. Gousallah of I Year was runner up in his weight in the Inter-Collegiate Knock-out Boxing Tournament. We hope that in the next academic year more boys of this college will come out successful in the selections in various spheres.

Inter-class Tournaments:

Inter-class tournaments were conducted in all games on a Knock-out basis. The fourth years stood out prominently in most of the games and were the Champions. It is to be mentioned that this group of students were champions from their first year onwards. The juniors also showed good promise and put up a good fight against the champions.

As an Open Air Theatre has been constructed this year, it is hoped that from next year onwards our boys will show more interest in dramas and connected activities.

Lack of enough leisure common in professional colleges shows its adverse effect in athletics and games. Still with their enthusiasm and vigour they are trying their best to make up this disadvantage.

"When the Great Scorer Comes,
To write against your Name;
He writes not that you won or lost,
But how you played the game"

Kipling.

P. U. Narayanan,
Physical Director.

Annual Report on Games and Sports

On the side of physical activities, we have been leading a very vigorous life in spite of the fact that our facilities for games have been very limited. Though we did not win trophies this year, our standard of games has been fairly high when compared to some of the other city colleges. Our players deserve special congratulations for the unabated interest they have shown and the promptness with which they turned up for any encounter. Success or defeat, our players' motto has ever been "play the game".

Individually all the players of various games were good, but it was in combination that we lacked. I can assert with confidence that with more practice matches we can raise our standard. Our forwards in Football and Hockey played a clever game but lacked in finishing. Mention must be made here of our veteran player Samuel Dawson who came to our rescue whenever needed and saved us many a time. Without his wholehearted co-operation our achievements would have been impossible.

Our performance in Volleyball and Cricket was more or less disappointing. These matches were played more for the games sake than the actual results. When compared to others, our Basketball team was far superior. In the Inter-collegiate Basket-ball tournament we scored the maximum number of points. The hero of the game in almost all these matches was Varadarajan. Proper encouragement and regular practice will make him a rank player. I would suggest that frequent friendly matches with other colleges be made possible. Thus we would improve our standard. Our boxers gave a good account of themselves in the Inter-collegiate meet. Md. Gousallah was the runner-up in his class weight.

Special mention must be made of our contribution to the University team. V. P. Sridharan, II Year, earned the distinction of being selected for the Madras University Football Team. There is good talent in him and we hope that he will keep it up. I wish him all the best in his attempts to bring credit to our college.

M. Thimmappa Rai represented the Madras Division in Javelin Throw in the Inter-Divisional Sports meet held at Karaikudi this year. My hearty congratulations to him.

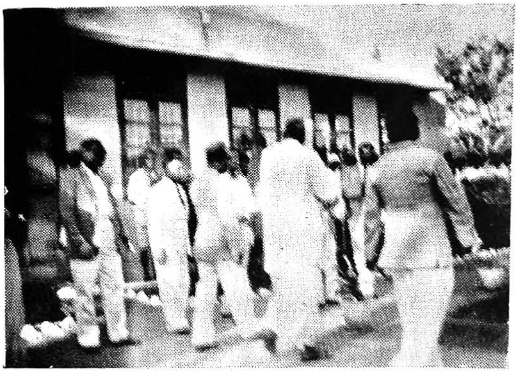
The 'new finds' of the season are Thomas Amaldoss, the atheletic champion of the year; Md. Madar; Bhaskar Singh; A. Abdul Rahim and Chinnaraj who with proper coaching and encouragement can accredit themselves well.

The Inter-class matches of this year were characterised by keen competition, friendly rivalry and high standard of performance.

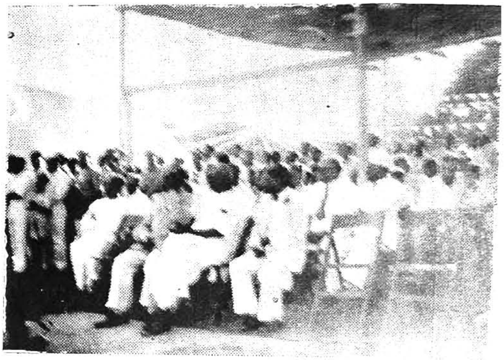
Sports. The annual sports was held in conjunction with the Annual College Day celebrations. It was a colourful spectacle with flags and festoons. Dr. I. D. Mantramurthy, Deputy Director of Animal Husbandry, Madras, took the salute of the march-past of the athletes and declared the meet open. Many of the items ended in a "photo-finish" style. None of the lady students took part this year.

I thank our Principal, Dr. Bertie A. D'Souza for his support, guidance and keen interest, Dr. F. D. Wilson, Sports Secretary and Dr. I. M. Rodricks. My thanks are due to our energetic and young Physical Director Mr. Narayanan, for the keen interest and enthusiasm taken by him both on and off the field. I specially thank P. O. George and S. Dawson for all the help rendered in executing my duties and I can frankly express that, but for their co-operation, my work would have been difficult. I will be failing in my duty if I do not thank each and every student of this college, especially the various Captains,

College Day Celebrations.

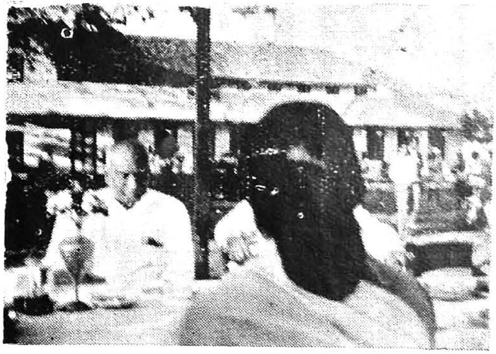


The Principal and Sports Secretary leading the Chief Guest to the Sports Field.

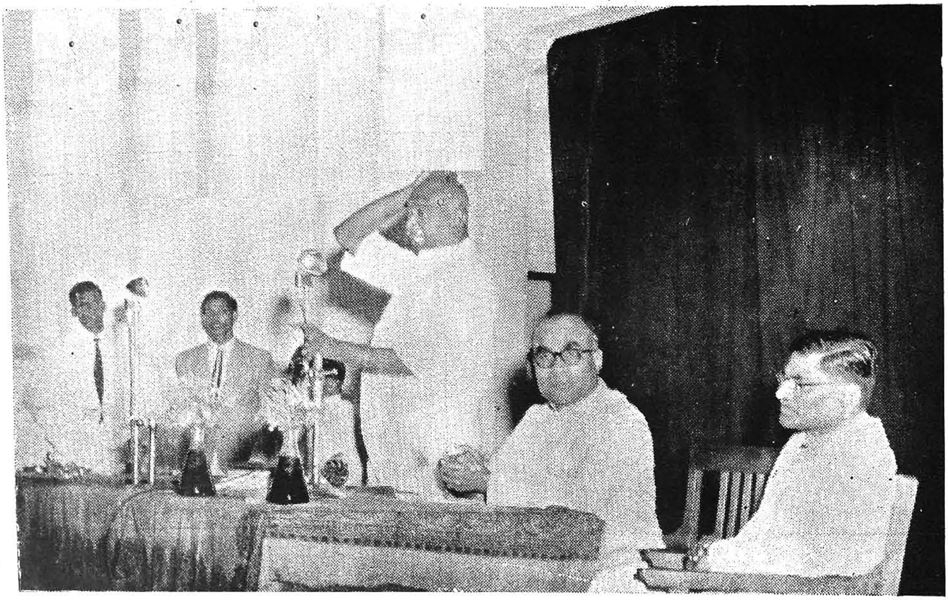


Guests.

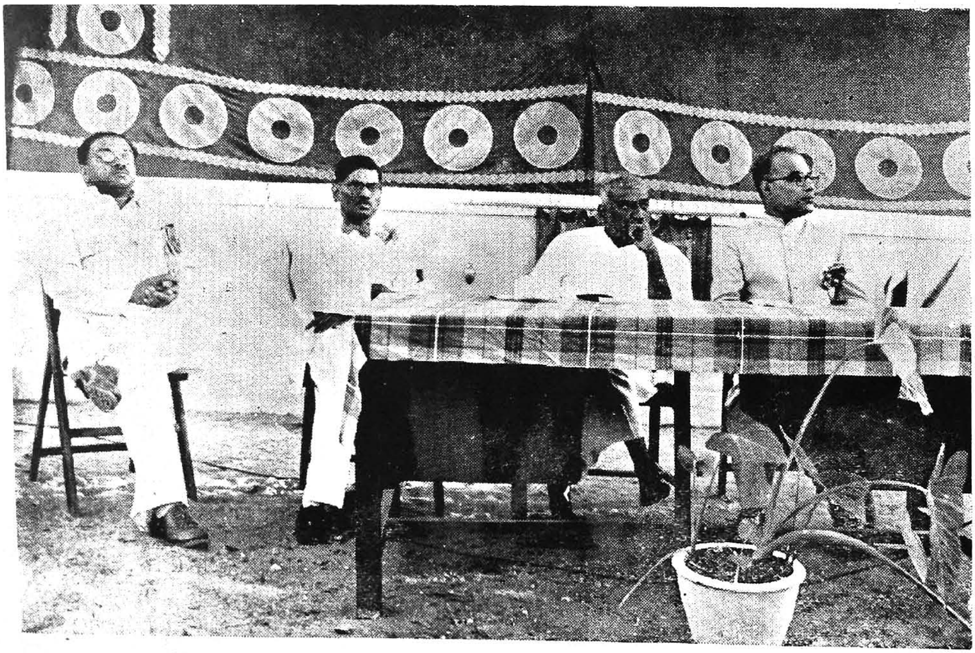
Sri K. Kamaraj Nadar giving the Start Staff *vs.* Students.



Chief Minister at Tea.



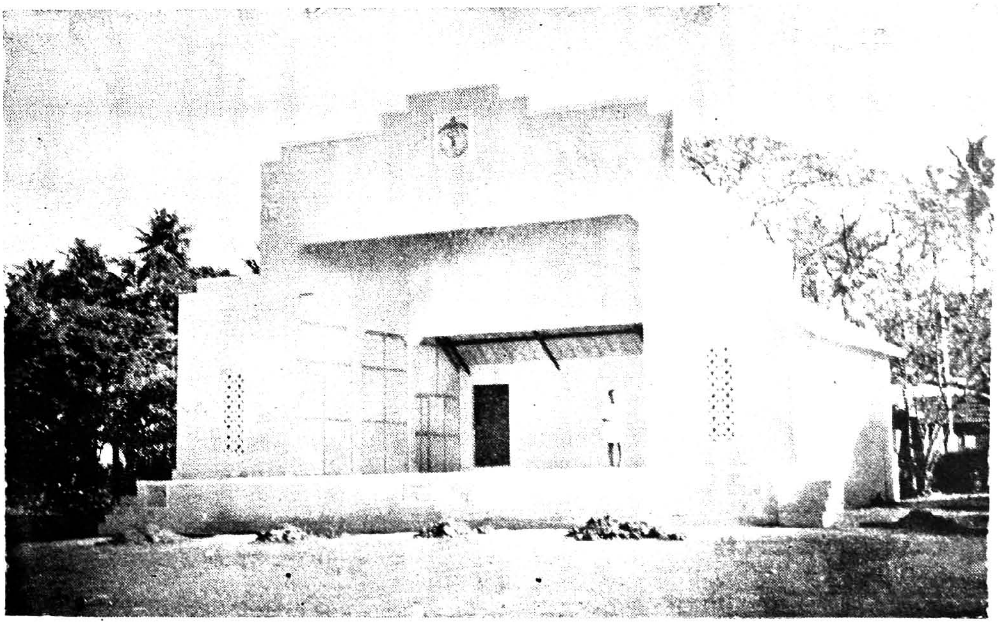
Sri K. Kamaraj Nadar addressing the gathering.



Left to Right :—Dr. F. D. Wilson (Sports Secretary), Mr. N. Murugesa Mudaliar, Deputy Secretary, Government of Madras, Agricultural Department Sri Kamaraj, the Principal.

Self help is the best help.

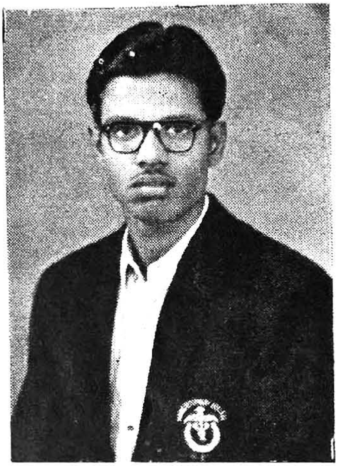
Our Labours



Our Reward

The Open Air Theatre was declared open by Sri K. Kamaraj Nadar, Chief Minister of Madras on 18th February, 1956.

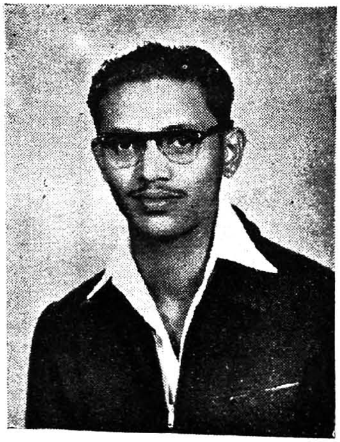
ATHLETICS



THOMAS AMALDOSS
College Champion.

M. THIMMAPPA RAI
Represented Madras Division in Javelin Throw.

MD. GOUSULLAH
Runner-up, Inter-Collegiate Boxing.



V. P. SRIDHARAN
Represented the University in Foot-Ball.

Vice-Captains and Sports Representatives for their co-operation throughout the year.

K. KRISHNAN KUTTY,
General Captain.

HOCKEY

It is very difficult to attribute the remarkable achievements of this year to any individual factor. I am aware that keen interest and enthusiasm shown by every hockey player had a great share for the grand performance in the Inter-collegiate matches. The lion share goes to the Sports Secretary and Physical Director who gave us the encouragements and incentives to enhance the morale of the team.

Mention must be made of the match with Government Arts College team in the Inter-collegiate fixture which was held to a draw inspite of bulwarks and wizards in the Government Arts College. A splendid defence, fortified with lightning speed foiled all the manœuvres of the Arts team. We routed the College of Indian Medicine by 5 goals to 1 and put on a spectacular performance with Loyola College.

Credit should be given to the nippy forwards especially Ambaprasad and Madar. The newcomers Bhasker Singh, Madan, Krishnamurthy and Jonathan showed signs of great promise. The live wire of the team was Kushalappa, who would never be beaten off in the half line. Madan Singh maintained his defensive game with powerful strokes. The Vice-Captain, Chinniah kept up the team spirit and always led the team in good form in my absence. I thank him for that. The Goal Keeper gave a good account of himself. Thimmappa Rai, a newcomer, has improved remarkably. He has a bright future.

Looking back on this academic year's performance. I am grateful to the Sports Secretary, Physical Director and to all the hockey players for their encouragement and co-operation.

J. STANISLAUS ANTONY,
Captain.

FOOTBALL

We started the season with little or no practice. Our team's strength was reinforced by the inclusion of Thomas Amaldoss, who was responsible for many wins. He is a good athlete and proved to be so. I am proud to report that V. P. Sridharan was selected to represent the University.

In the Inter-collegiate League tournaments, we made a good start by winning against two colleges in succession. The defence as usual was our strong point. Krishnan Kutty, S. Dawson and V. P. Sridharan, were the backbone of our team. We won five matches creditably in our zone. The match with Madras Medical College was splendid and noteworthy, where all our players exhibited their abilities in unity and in perfect harmony.

In the Knock-out and May and Baker Tournaments. we lost the match to Law and Central Polytechnic, the goals being scored in the last minute. P. Ramakrishna, Prabakaran, Kandaswamy, Sridharan and Rama Raju played well.

I thank Dr. Sanjiva Rao and Dr. Rodricks for their timely help and encouragement. I take this opportunity to thank our enthusiastic Sports Secretary, Dr. F. D. Wilson, who came with us for many matches and encouraged us. My thanks are due to the Physical Director Mr. P. U. Narayanan and to all members of the team for their ready co-operation and enthusiasm.

R. S. KARKHANI,
Captain.

BASKET BALL

We gave a good account of ourselves in all the matches we played and had shown marked improvement in all departments of the game. We opened the season with a creditable victory over Stanley and subsequently over Presidency, Arts and Jain Colleges. We lost to Christian College and Law College.

This year we participated in the Loyola tournaments and lost narrowly to Loyola and this I can safely say was due to lack of practice.

Who is Who in the Team

Dawson: Our right wing was the top scorer in many of the matches. The best game he played was against Presidency. We are sorry to lose his services next year and wish him the best of luck in his future career.

Varadarajan: Our centre forward fed the wings well. His moves were noteworthy. He is the Vice-Captain of the team.

Ramaraju: Played a marvellous game with Christian College and was congradulated by them.

Daniel: A newcomer played in the guard position and showed good judgment to the balls. He foiled many of the opponents moves.

Raphael: Showed good spirit in the game and always was at his best.

Krishnan Kutti: Played well in the defence position.

Balaraj: Also a newcomer. Much can be expected from him in the coming season.

My thanks are due in no small measure to the Vice-Captain and the players for their wholehearted co-operation. I take this opportunity, on behalf of the team to thank the Sports Secretary and the Physical Director for the keen interest they have taken in us.

JOHN JOSEPH,
Captain.

VOLLEYBALL

We started the season with a creditable victory over Meston Training College. Our performance in the Inter-collegiate tournament in almost all the matches was splendid. We beat Arts College very easily and got a walk over Jain College. Our best performance was against the strong Law College, with excellent team work and sportsmanship. We fought hard but lost the match very narrowly. This year's team has been reinforced by Chinnaraj and Abdul Rahim. Ranga Rao was outstanding with his powerful smashes and fine placings.

On behalf of our team, I thank the Sports Secretary, Dr. F. D. Wilson and the Physical Director, Mr Narayanan for their timely help and encouragement. I take this opportunity to thank all the members of the team for their ready help and co-operation.

With little more practice my successor will be able to put up a good team next year.

H. RAMANANDA SHETTY,
Captain.

BOXING

Our success in boxing this year was noteworthy. I am happy to say that our Vice-Captain Md. Ghousallah was a runner-up in the Inter-Collegiate Boxing Championship.

Inter-class boxing tournament for the year could not be held due to unavoidable circumstances. Nevertheless, students availed the training and I hope they would give a good account of themselves next year.

I take this opportunity to thank the Sports Secretary, Physical Director for their kind guidance and Mr. C. D. Masilamany, the boxing coach for his kind assistance and encouragement given to the younsters entering the ring for the first time.

J. S. AUSTIN ANANTHARAJ,
Captain.

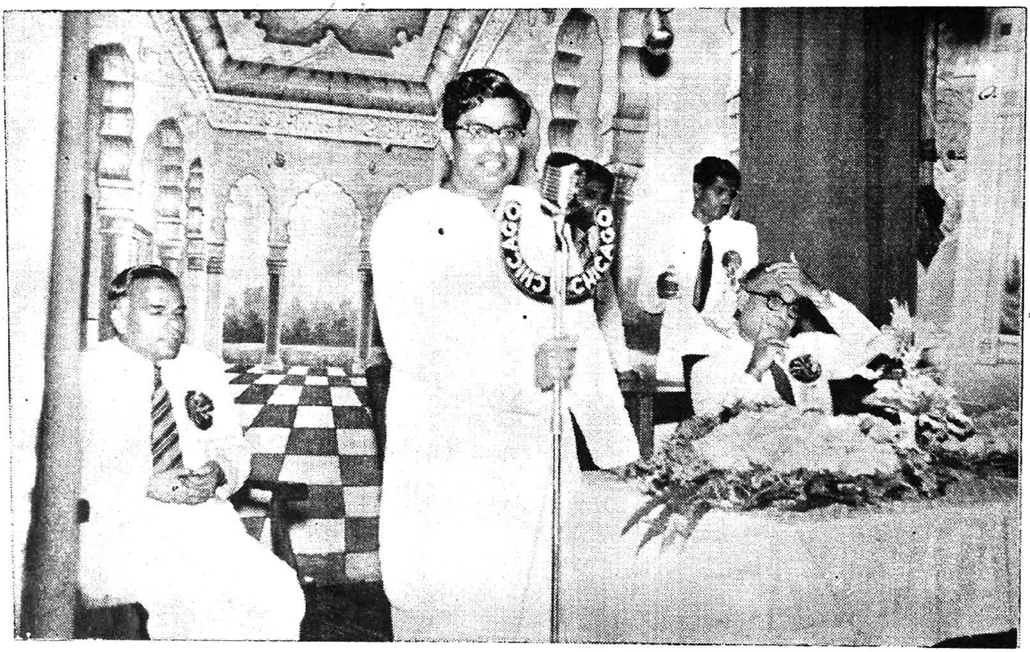
ATHLETIC ASSOCIATION 1955-56.

Sitting :—M. Thimmappa Rai, Ramananda Shetty (Captain V. Ball), John Joseph (Captain B. Ball), K. Krishnan Kutty (General Captain), Dr. F. D. Wilson, G.M.V.C., B.V.Sc. (Sports Secretary), Dr. B. A. D'Souza, G.M.V.C., B.V.Sc., P. G. (Mukt) (Principal), P. U. Narayanan, B.A., D.P.Ed. (Physical Director), J. S. Anthony (Captain Hockey), S. Kamalesan (Captain Cricket), R. S. Karkani (Captain F. Ball), Austin Anantharaj (Captain Boxing).

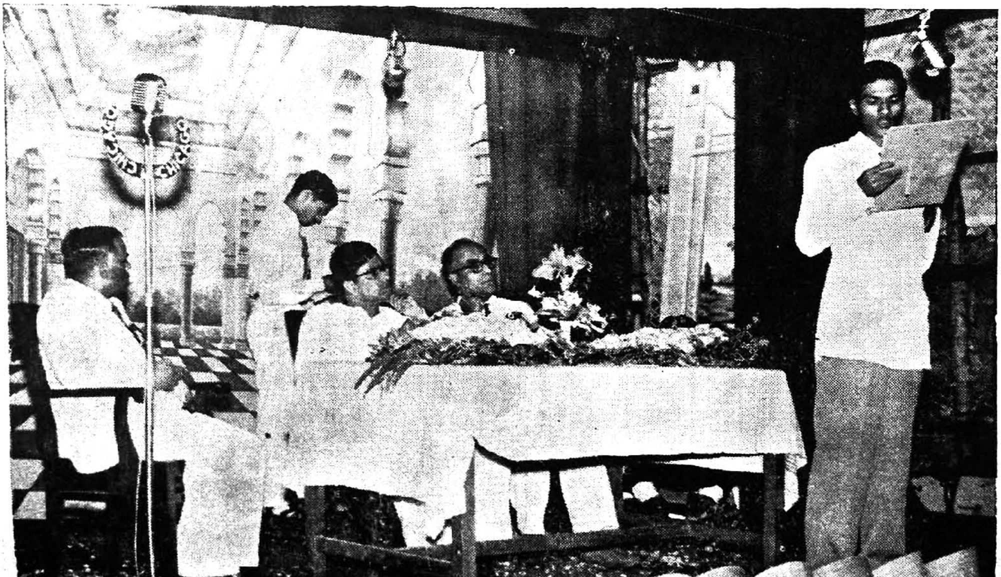
Standing 1st Row :—T. N. Varadarajan (V. Captain B. Ball), G. P. Chinnayya (V. Captain Hockey), Basker Singh, T. Prabhakaran, P. A. Balu (V. Captain V. Ball), V. P. Sridharan, Inderjit Singh, Habibullahkhan, R. Krishna Murthy, K. S. Kushalappa, N. B. Madan Singh, V. V. Ramaraju (V. Captain F. Ball).

Standing 2nd Row :—Amba Prasad, Balaguru, R. Krishnan, G. S. C. Ranga Rao, P. Rama Rao, Padmanabha Reddy, Radhakrishna Reddy (V. Captain Cricket), P. Padhi, Balachandran Nair, P. Ramakrishna, D. Balasubramanyam.

Standing 3rd Row :—C. S. Sridhar, Thomas Amuldas, C. Daniel, Abdul Rahim, S. Kandaswamy, Md. Madar. Md. Ghosullah (V. Captain Boxing) Arjunan (Marker).

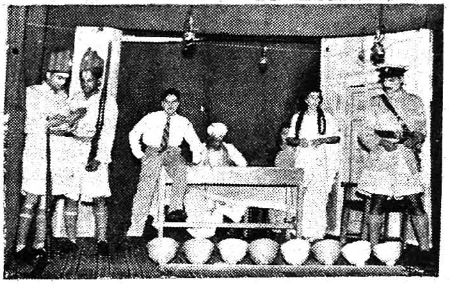


Sri. C. Subramanian, The Chief Guest addressing the Gathering.



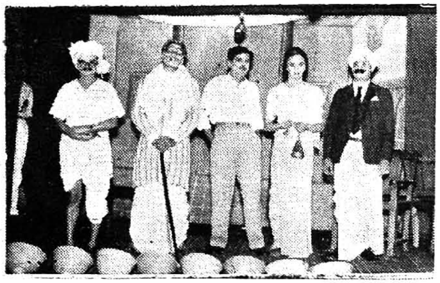
The Secretary reading the Annual Report.

SCENES ON HOSTEL DAY

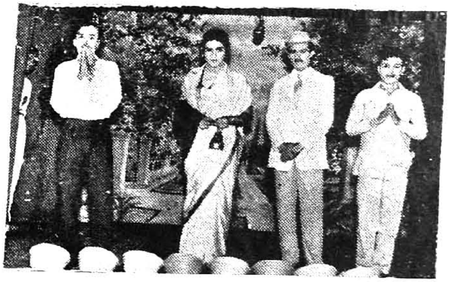


Tamil Drama.

English Drama.



Telugu Drama.



Kanarese Drama.

A Report on College Day, Annaul Sports and Inauguration of Open Air Theatre

The College Day and Annual Sports of the Academic year 1955–56 was held on 18th February 1956 to facilitate the completion of Open Air Theatre, which had been in the progress of making for nearly a year. The Chiet Minister of Madras, Sri Kamaraj kindly consented to inaugurate the Open Air Theatre and consequently he was our Chief Guest for the College Day and Sports.

This year, the Annual Sports took a glamorous turn, in having had the service of Sports Secretary from start to finish accentuated by the help rendered by the Physical Director and student volunteers. It would be no exaggeration to say, that the spectacular display of the Open Air Theatre draped in its gorgeous drapers, enhanced the athletic outlook of the day and many feasted their eyes on the array of tents decorated with festoons and the neat lay out of the track and fields.

It was a Sunny Day and many interesting items were held in sports and everyone showed keen enthusiasm including the members of the staff. The Chief Minister arrived in time and the tea party gave new cheer to all. The Chief Minister inaugurated the Open Air Theatre and the Principal, Dr. Bertie A. D'Souza welcomed the Chief Minister and read a report on the College activities. He made emphasis on the contribution made by the students in the building of the Open Air Theatre. The Chief Minister in reply spoke on the importance of Veterinary profession and the special help rendered by student volunteers in Cyclone affected districts. Dr. Frank D. Wilson, the Sports Secretary proposed a vote of thanks after the distribution of prizes.

Thus the College Day and Sports of this academic year brought in the existence of an Open Air Theatre which would be henceforth the nucleus of all dramatic and cultural activities of the College : we are indeed proud of our little share in the making of it. It has certainly lighted the torch which would be carried through for years by the continuous flow of students of great calibre that pass through this worthy Institution.

STANISLAUS ANTONY,
Student Chairman.

All India Veterinary Students' Conference

The Second Annual Conference of the All India Veterinary Students' Association was held at the Madras Veterinary College, Madras on 18th and 19th February 1956. Dr. Bertie A. D'Souza, Principal, presided. Rao Sahib Sri T. Vinayaka Mudaliar, Editor, Indian Veterinary Journal and General Secretary, All India Veterinary Association, was the speaker.

Mr. Arun Chatterjee of Bengal, President, All India Veterinary Students' Association in his introductory remarks, exhorted the students to make the Association a success and requested them to co-operate in building up the association which is in an embryonic stage.

Dr. Bertie A. D'Souza, Principal, in his speech, said that the students have set themselves a hard task in trying to bring into existence a country-wide organisation and he hoped that it would prove an instrument for good, both to the students and the profession. He added that no better person could have been thought of to give the necessary lead in the matter than Sri Rao Sahib T. Vinayaka Mudaliar, who has gone grey in the service of the profession.

Sri Rao Sahib T. Vinayaka Mudaliar said, as far as he could see this conference of the All India Veterinary Students' Association could have only one object and that is to make the future veterinarian of this land a better equipped and a better trained man, second to none in veterinary science in the whole world. Towards that end in view this conference of students can ask for highest facilities in this land itself for specialisation in the several subjects of Veterinary Science and for doing all kinds of Post-graduate work in India itself. They can ask for the best students in each subject to be given facilities for higher studies in that subject and for specialisation with the aid of some form of scholarship or other.

They can ask at University level for periodic lectures in special subjects by specialists in the line. They can ask for Inter-University educational tours in different States. But, he added, never make a fetish of anything. Never agitate, keep your credentials open and above board for communism is round the corner and rightly or wrongly it is much dreaded.

The minutes of the previous meeting were read and adopted.

Mr. S. Thandava Krishna proposed the vote of thanks.

S Thandava Krishna,
General Secretary,
All India Veterinary Students' Association.

Our Mails

Inland

Christian Medical College, Vellore.
College of Engineering, Madras.
Madras Christian College, Tambaram.
Madras Medical College, Madras.
Stanley Medical College, Madras.
College of Indian Medicine, Madras.
Agricultural College, Coimbatore.
Womens' Christian College, Madras.
Presidency College, Madras.
Meston Training College, Madras.
Queen Mary's College, Madras.
Law College, Madras.
Lady Willington Training College, Madras.
Teachers' College, Madras.
St. Christopher's Training College, Madras.
Ethiraj College, Madras.
Loyola College, Madras.
Vivekananda College, Madras.
Central Polytechnic, Madras.
Andhra Medical College, Vishakapatnam.
Mysore Medical College, Mysore.
Agricultural College, Bapatla.
St. Joseph's College, Bangalore.
St. Joseph's College, Tiruchirapalli.
Central College, Bangalore.
St. Philomena's College, Mysore.
St. Aloysius' College, Mangalore.
Government College, Mangalore.
Government College, Coorg.
Government Brennen College, Tellicherry.
Sri Guruvayyurpan College, Kozikode.
C.M.S. College, Kottayam.
Thevara's College, Cochin.
Government College, Kumbakonam.
Government College, Palghat.
Bombay Veterinary College, Bombay.
Calcutta Veterinary College, Calcutta.
Veterinary College, Mathura.
Veterinary College, Jabalpur.
Veterinary College, Hyderabad—Deccan.
Bihar Veterinary College, Patna.
Punjab Veterinary College, Lahore.
Andhra Veterinary College, Bapatla.
T—C .Veterinary College, Trichur.
Madyabharat Veterinary College.
Rajastan Veterinary College.
Assam Veterinary College,—Gauhati.
Indian Veterinary Journal, Madras.
Veterinary Research Institute, Muktes-war.
Veterinary Research Institute, Izatnagar.
Indian Dairy Research Institute, Bangalore.
Institute of Veterinary Preventive Medicine, Ranipet.
Indian Council of Agricultural Research, New Delhi.
Director of Animal Husbandry, Madras.
" " Mysore.
" " Andhra.
" " Travancore and Cochin.
" " Hyderabad.
" " Orissa.
" " Calcutta.
" " Punjab.
Director of Veterinary Services—Madya Pradesh.
Animal Husbandry Commissioner, Lucknow.
Pasteur Research Institute, Coonoor.
Madras University Library, Madras.
Connemara Public Library, Madras.
The National Library, Calcutta.
Director, King Institute, Guindy.
Director, Rockfeller Virus Research Centre, Poona.
Agricultural Research Institute, Pusa, New Delhi.

Foreign

Director of Veterinary Education, Glasgow, University
Journal of American Veterinary Medical Association, Chicago.
Netherlandsch Indische Bladenvoor, (Java). Netherlands Indies.
The Puerto Rico Journal of Public Health and Tropical Medicine, U.S.A.

Dean, Faculty of Veterinary Medicine, University of Pennsylvania, U.S.A.

The Director, Molteno Institute, Cambridge, England.

Natura-en Genecskundige, Belgium.

Editor, Veterinary Medicine, Illinois, U.S.A.

Editor Lederle Veterinary Bulletine, New York.

The Hon. Librarian, South African Veterinary Medical Association.

Dean, College of Veterinary Medicine, University of Pilippines.

Dean, Michigan State College of Agriculture.

Dean, School of Veterinary Medicine. Texas., U.S.A.

Dean, Division of Veterinary Medicine, Kanas State College, U.S.A.

The Director of Veterinary Services, Pretoria, S. Africa.

The Dean, The Ohio State University. Ohio, Columbus, U.S.A.

Gebr. Bischoff, Buchdrukerej, Verlags, Ansfalf, Deutsches Reich.

United States Department of Agriculture Library, Washington.

Editor, Veterinary Record, London.

Editor, Cornell Veterinarian, Ithaca, New York, U.S.A.

London School of Hygiene & Tropical Medicine, England.

Editor, The North American Veterinarian, Evanston, Illinois, U.S.A.

Imperial Bureau of Animal Husbandry Veterinary Laboratory, England.

Dean, The New York State Veterinarian, Cornell University, Ithaca.

Haver Glover Monthly Messenger Chicago, U.S.A.

Ontario Veterinary College, Canada.

Australian Veterinary Journal, Sydney.

Veterinary Journal, London W.C. 2, England.

Royal Veterinary College, London.

Royal Veterinary College, Dublin.

Veterinary College, Paris.

Chief of Veterinary Services, Pasteur Institute, Paris, France.

Chinese Medical Association, China.

College of Veterinary Medicine, Washington, U.S.A.

Lowa, Veterinarian, Knoxville, U.S.A.

R.A.V.C. Journal, Aldershot, England.

The Librarian Medical Library, Liverpool 3. England.

Dr. J. Russel Greig Moredum Institute, Edinburgh, Scotland.

Royal Veterinary College, Edinburgh, Scotland.

Principal, Veterinay College Berlin, Germany.

Dean, School of Veterinary Science, Liverpool, England.

Director of Veterinary Pathology, University of Zurich, Switzerland.

A.V.C. School, England.

Ontario Veterinary College, Canada.

Poultry Pathologist, New Jersey, U.S.A.

Royal Veterinary College, Stockholm, Sweden.

College of Veterinary Medicine, University of California—U.S.A.

College of Veterinary Medicine, St. Paul's Minnesota, U.S.A

Director, Veterinary Laboratory, Weybridge, England.

Vlaams Diergineeskundig Tijdscheift, Holland.

Journal of the Royal Army Veterinary Corps., R.A.V.C. Laboratory, England.

Dean, Faculty of Veterinary Medicine, Ceylon.

Director, Veterinary Laboratory, Storment, Belfast, N. Ireland.

Director, Lister Institute of Medicine, London.

Hannal Dairy Research Institute, Aye, Scotland.

Spallanzani Institute of Artificial Insemination Milan, Italy.

Foot & Mouth Disease Laboratory Pirbright, Surrey, England.

Veterinary College, Berne, Switzerland.

Veterinary College, Zurich, Switzerland.

Royal Veterinary College, Brussels, Belgium.

Veterinary School, University of Milan Italy.

Rowett Research Institute, Aberdeen, Scotland.

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